NetExtreme II Family Adapters

AT-2973SX
AT-2973T
AT-2973T/4

Installation and User's Guide

613-001252 Rev. B

Allied Telesis™

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Electrical Safety and Emissions Standards

This product meets the following standards.

Federal Communications Commission Interference Statement

Declaration of Conformity

Manufacturer Name: Allied Telesis, Inc.

Declares that the product: **NetExtreme II Family Adapters**

Model Numbers: **AT-2973SX, AT-2973T, AT-2973T/4**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device must not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:
FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IEEE802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

European Union Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment

This Allied Telesis RoHS-compliant product conforms to the European Union Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment. Allied Telesis ensures RoHS conformance by requiring supplier Declarations of Conformity, monitoring incoming materials, and maintaining manufacturing process controls.

RFI Emissions	FCC Class B, EN55022 Class B, VCCI Class B, C-TICK, CE
Immunity	EN55024
Electrical Safety	EN60950-1 (TUV), UL 60950-1 ($_{C}UL_{US}$)
Laser Safety	EN60825

Translated Safety Statements

Important: The ✍ indicates that a translation of the safety statement is available in a PDF document titled “Translated Safety Statements” on the Allied Telesis website at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of documents.

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Preface

This guide contains instructions on how to install the AT-2973SX, AT-2973T, AT-2973T/4 adapters and configure the adapters using the driver software.

The Preface discusses the following topics:

- ❒ “Safety Symbols Used in this Document” on page 12
- ❒ “Where to Find Web-based Guides” on page 13
- ❒ “Contacting Allied Telesis” on page 14
- ❒ “Management Software Updates” on page 14

Safety Symbols Used in this Document

This document uses the safety symbols defined in Table 1.

Table 1. Safety Symbols

Symbol	Meaning	Description
	Caution	Performing or omitting a specific action may result in equipment damage or loss of data.
	Warning	Performing or omitting a specific action may result in electrical shock.

Where to Find Web-based Guides

The installation and user guides for all Allied Telesis products are available in portable document format (PDF) on our web site at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of documents.

Contacting Allied Telesis

This section provides Allied Telesis contact information for technical support as well as sales or corporate information.

Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base: **www.alliedtelesis.com/support/kb.aspx**. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

Email and Telephone Support

For Technical Support via email or telephone, refer to the Support section of the Allied Telesis web site: **www.alliedtelesis.com/support**.

Returning Products

Products for return or repair must first be assigned a return materials authorization (RMA) number. A product sent to Allied Telesis without an RMA number will be returned to the sender at the sender's expense. For instructions on how to obtain an RMA number, go to the Support section on our web site at **www.alliedtelesis.com/support/rma.aspx**.

For Sales or Corporate Information

You can contact Allied Telesis for sales or corporate information through our web site at http://**www.alliedtelesis.com/purchase**.

Warranty

Go to **www.alliedtelesis.com/warranty** for the specific terms and conditions of the warranty and for warranty registration for the AT-2973SX, AT-2973T, and AT-2973T/4 adapters.

Management Software Updates

New releases of management software for our managed products are available from both of the following web sites:

- Allied Telesis web site: **www.alliedtelesis.com/support/software/**
- Allied Telesis FTP server:**ftp://ftp.alliedtelesis.com**

If you prefer to download new software from the Allied Telesis FTP server from your workstation's command prompt, you will need FTP client software and you must log in to the server. Enter "anonymous" for the user name and your email address for the password.

Chapter 1

Introducing the AT-2973SX, AT-2973T, and AT-2973T/4 Adapters

This chapter provides an introduction to the Allied Telesis AT-2973SX, AT-2973T, and AT-2973T/4 NetExtreme II Family Adapters and discusses the following topics:

- ❒ “Functional Descriptions” on page 16
- ❒ “Features” on page 22

Functional Descriptions

The AT-2973SX, AT-2973T, and AT-2973T/4 Broadcom NetXtreme II adapters are a new class of Gigabit Ethernet (GbE) converged network interface controller (C-NIC) that can simultaneously perform accelerated data networking and storage networking on a standard Ethernet network. The C-NIC offers acceleration for all popular protocols used in the data center, such as:

- TCP Offload Engine (TOE) for accelerating TCP
- Internet Small Computer Systems Interface (iSCSI) offload for accelerating network storage access featuring centralized boot functionality (iSCSI boot)

Enterprise networks that use multiple protocols and multiple network fabrics benefit from the C-NICs ability to combine data communications, storage, and clustering over a single Ethernet fabric by boosting server CPU processing performance and memory utilization while alleviating I/O bottlenecks.

The AT-2973SX adapter is set to a speed of 1000 Mbps in full duplex mode automatically. You cannot change the speed or duplex mode of this adapter.

The AT-2973T and AT-2973T/4 adapters include a 10/100/1000-Mbps Ethernet MAC with both half-duplex and full-duplex capability and a 10/100/1000-Mbps PHY. The transceiver is fully compatible with the IEEE 802.3 standard for auto-negotiation of speed.

As part of the company's green range, all of three adapters are engineered to reduce power consumption. They incorporate centralized power management features that automatically place idle circuitry into a lower power mode to save energy.

The following sections provide functional descriptions of the AT-2973SX, AT-2973T, and AT-2973T/4 adapters:

- "AT-2973SX Adapter" on page 17
- "AT-2973T Adapter" on page 18
- "AT-2973T/4 Adapter" on page 20

AT-2973SX Adapter

The AT-2973SX adapter connects a PCI-E compliant server or workstation to a Gigabit Ethernet network using fiber optic cabling and a connector that meets 62.5/125 µm or 50/125 µm multimode specifications. This adapter operates at speeds of 1000 Mbps in full-duplex mode.

The AT-2973SX adapter is show in Figure 1.

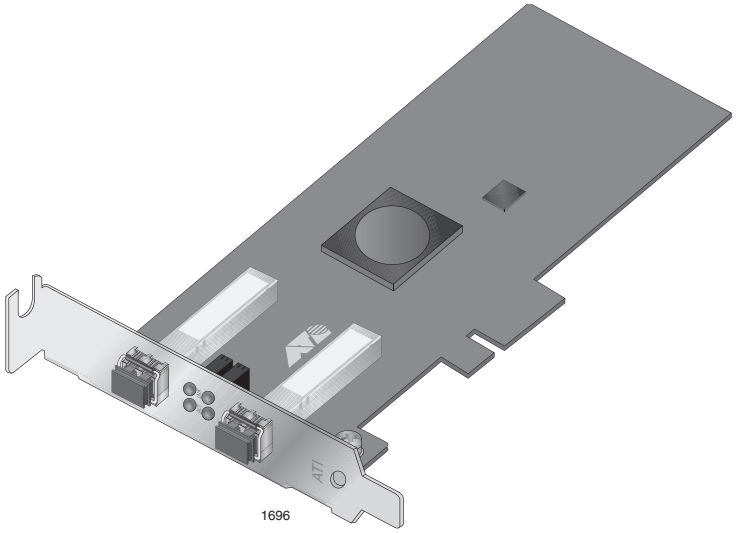

Figure 1. AT-2973SX Adapter

AT-2973SX Adapter Physical Description

The faceplate on the AT-2973SX adapter provides two fiber optic connectors for attaching the adapter to a compatible link partner. See Figure 2 for an illustration of the adapter's faceplate.

The AT-2973SX adapter has two fiber ports and two LEDs per port, as shown in Figure 2 and described in Table 1 on page 18. The state of the network link and activity is indicated by a single LED located adjacent to the port connector.

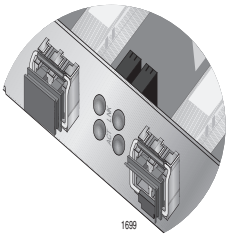

Figure 2. AT-2973SX Faceplate

For AT-2973SX LED information, see Table 1.

Table 1. Network Link and Activity Indicated by the RJ-45 Port LEDs

Port LED	LED Appearance	Network State
Link LED	Off	No link (cable disconnected)
	Continuously illuminated	Link
Activity LED	Off	No network activity
	Blinking	No network activity

AT-2973T Adapter

The AT-2973T adapter operates at speeds of 10/100/1000T Mbps in both full-duplex and half-duplex modes. This adapter has two twisted-pair connectors and two LEDs, as shown in Figure 3.

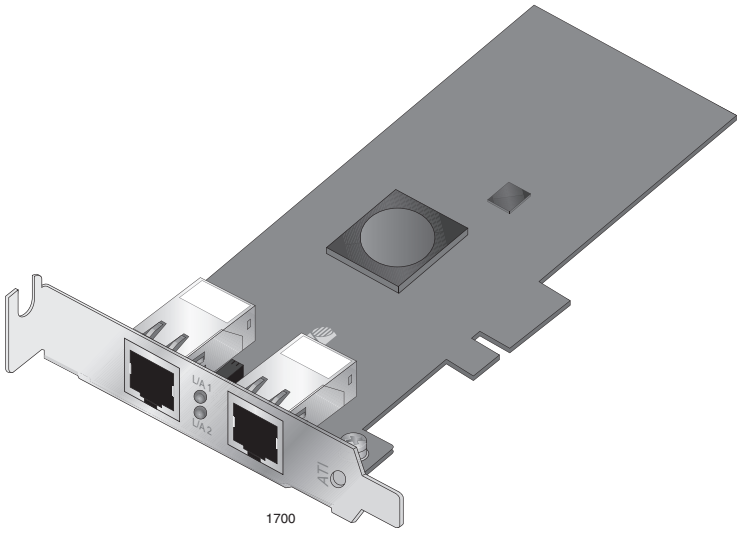

Figure 3. AT-2973T Adapter

AT-2973T Adapter Physical Description

The faceplate on the AT-2973T adapter provides two twisted-pair connectors for attaching the adapter to a compatible link partner. See Figure 4 on page 19 for an illustration of the adapter's faceplate and LEDs.

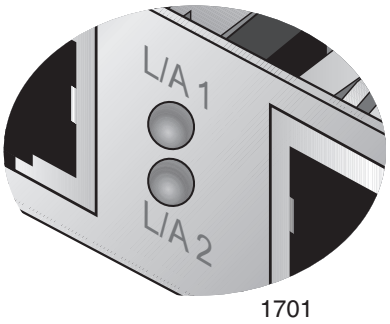

Figure 4. AT-2973T Faceplate

For copper-wire Ethernet connections, the state of the network link and activity is indicated by the LEDs on the RJ-45 connector. The LED labeled L/A1 indicates port 1 and the LED labeled L/A2 indicates port 2. See Table 2.

Table 2. Network Link and Activity Indicated by the RJ-45 Port LEDs

Port LED	LED Appearance	Network State
Link LED	Off	No link (cable disconnected)
	Continuously illuminated	Link
Activity LED	Off	No network activity
	Blinking	No network activity

AT-2973T/4 Adapter

The AT-2973T/4 adapter is a PCI-Express adapter that operates at speeds of 10/100/1000T Mbps in both full-duplex and half-duplex modes. This adapter has four twisted-pair connectors and eight LEDs, as shown in Figure 5.

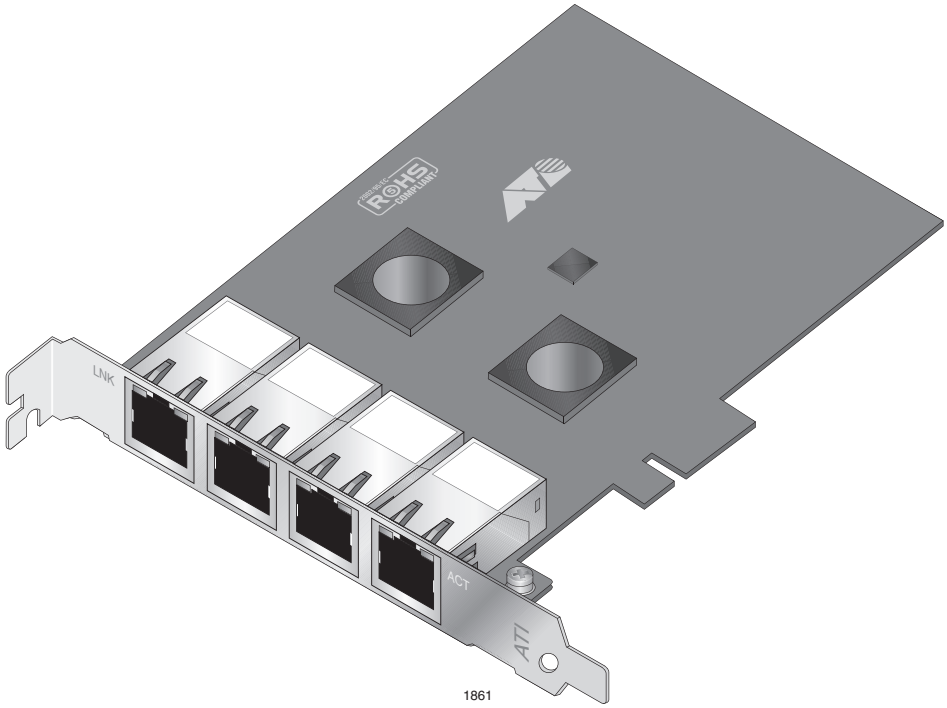

Figure 5. AT-2973T/4 Adapter

AT-2973T/4 Adapter Physical Description

The faceplate on the AT-2973T/4 adapter provides four twisted-pair connectors for attaching the adapter to a compatible link partner. The ports numbers are not shown on the card. See Figure 6 for the port numbers and the LED assignments. When the adapter is mounted vertically, the top LED is the Link LED and the bottom LED is the activity (ACT) LED.

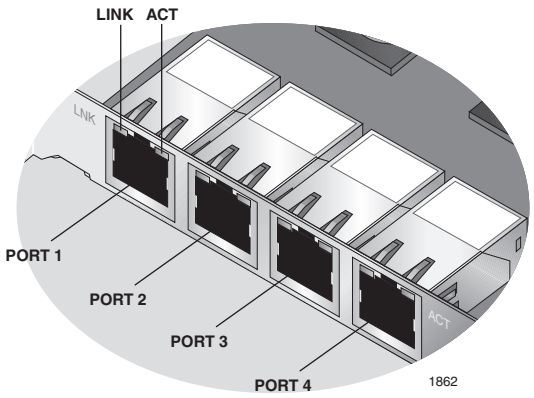

Figure 6. AT-2973T/4 Faceplate

For copper-wire Ethernet connections, the state of the network link and activity is indicated by the LEDs on the RJ-45 connector, as described in Table 3.

Table 3. Network Link and Activity Indicated by the RJ-45 Port LEDs

Port LED	LED Appearance	Network State
Link LED	Off	No link (cable disconnected)
	Continuously illuminated	Link
Activity LED	Off	No network activity
	Blinking	Network activity

Features

The following list of features for the AT-2973SX, AT-2973T, AT-2973T/4 adapters applies to all of the supported operating systems:

- TCP Offload Engine (TOE)
- Internet Small Computer Systems Interface (iSCSI) offload
- Single-chip solution
  - Integrated 10/100/1000BASE-T transceivers
  - 10/100/1000 triple-speed MAC
  - Host interfaces
  - SerDes interface for optical transceiver connection
  - PCI Express v1.1 x4 and v2.0 compliant (Gigabit Ethernet)
  - Full fast-path TCP offload
- Other performance features
  - TCP, IP, UDP checksum
  - TCP segmentation
  - Adaptive interrupts
  - Receive Side Scaling (RSS)
- Manageability
  - Broadcom Advanced Control Suite (BACS) 3 diagnostic and configuration software suite
  - Supports PXE 2.0 specification (Linux Red Hat PXE Server, SUSE Linux Enterprise Server, Windows Server 2000, Windows Server 2003, Windows Server 2008, Windows Server 2008 R2, Intel APITEST, DOS UNDI)
  - Wake on LAN support
  - Statistics for Simple Network Management Protocol (SNMP) MIB II, Ethernet-like MIB, and Ethernet MIB (IEEE Std 802.3z, Clause 30)

  - SMBus controller
  - ACPI 1.1a compliant (multiple power modes)
  - IPMI support
- Advanced network features
  - Jumbo frames (up to 9 KB). The OS and the link partner must support jumbo frames.
  - Virtual LANs
  - IEEE Std 802.3ad Teaming
  - Smart Load Balancing Teaming
  - Smart Load Balancing TOE Teaming (with the correct configuration)
  - Flow Control (IEEE Std 802.3x)
  - LiveLink™ (supported in both the 32-bit and 64-bit Windows operating systems)
  - Logical Link Control (IEEE Std 802.2)
- Layer-2 Priority Encoding (IEEE Std 802.1p)
- High-speed on-chip RISC processor
- Up to 4 classes of service (CoS)
- Integrated 96 KB frame buffer memory
- iSCSI Boot support

TCP Offload Engine (TOE)

The TCP/IP protocol suite is used to provide transport services for a wide range of applications for the Internet, LAN, and for file transfer. The TCP protocol is specifically designed to insure that data packets are delivered error free and in the correct sequence from an application running a one computer to the receiving application. The TCP protocol suite historically has run on the host CPU, but with higher data rates, this consumes a very high percentage of its resources while leaving little resources for the applications. With the use of the Broadcom NetXtreme II adapter and the TCP Offload Engine feature, the TCP/IP processing can be moved to hardware, freeing the CPU for application processing and other higher priority tasks.

The TCP/IP protocol suite is used to provide transport services for a wide range of applications for the Internet, LAN, and for file transfer. Without the TCP Offload Engine, the TCP/IP protocol suite runs on the host CPU, consuming a very high percentage of its resources and leaving little resources for the applications. With the use of the Broadcom NetXtreme II

adapter, the TCP/IP processing can be moved to hardware, freeing the CPU for more important tasks such as application processing.

The Broadcom NetXtreme II adapter's TOE functionality allows simultaneous operation of up to 1024 fully offloaded TCP connections for 1-Gbps network adapters. The TOE support on the adapter significantly reduces the host CPU utilization while preserving the implementation of the operating system stack.

Internet Small Computer Systems Interface (iSCSI)

The IETF has standardized the Internet Small Computer Systems Interface (iSCSI). SCSI is a popular protocol that enables systems to communicate with storage devices, using block-level transfer (that is, address data stored on a storage device that is not a whole file). In addition, iSCSI maps the SCSI request and response application protocols and its standardized command set over TCP/IP networks.

As iSCSI utilizes TCP as its sole transport protocol, it greatly benefits from hardware acceleration of the TCP processing (that is, use of a TOE). However, iSCSI as a Layer 5 protocol has additional mechanisms beyond the TCP layer. iSCSI processing can also be offloaded, thereby reducing CPU utilization even further.

The Broadcom NetXtreme II adapter targets best-system performance, maintains system flexibility to changes, and supports current and future OS convergence and integration. Therefore, the adapter's iSCSI offload architecture is unique as evident by the split between hardware and host processing.

Power Management

When the system is down and waiting for a wake-up signal, the adapter speed connection may be at 10 Mbps or 100 Mbps. However, it can return to 1000 Mbps when the system is up and running if it is connected to a 1000 Mbps capable switch. For this reason, connect systems that use the Wake on LAN (WOL) feature to a switch capable of both 1000 and 10/100 Mbps speeds.

Wake on LAN (WOL) Feature

The WOL feature sets the speed at which the network adapter connects to the network while the adapter is in Wake on LAN (WOL) mode which is enabled automatically. The default speed for WOL mode is 100 Mb. An adapter can negotiate speeds between 10 Mb and 100 Mb. You cannot configure this feature because it is enabled automatically.

Note
The WOL feature is supported on the AT-2973T and AT-2973T/4 adapters. It is not supported on the AT-2973SX adapter. For more information, see “Limitations” on page 66.

Note
For specific systems, see your system documentation for information about support of the WOL feature.

Adaptive Interrupt Frequency

The adapter driver intelligently adjusts host interrupt frequency based on traffic conditions to increase overall application throughput. When traffic is light, the adapter driver interrupts the host for each received packet, minimizing latency. When traffic is heavy, the adapter issues one host interrupt for multiple, back-to-back incoming packets, preserving host CPU cycles.

ASIC with Embedded RISC Processor

The core control for Broadcom NetXtreme II adapters resides in a tightly integrated, high-performance ASIC. The ASIC includes a RISC processor. This functionality provides the flexibility to add new features to the card and adapts it to future network requirements through software downloads. This functionality also enables the adapter drivers to exploit the built-in host offload functions on the adapter as host operating systems are enhanced to take advantage of these functions.

Supported Operating Environments

The Broadcom NetXtreme II adapter has software support for the following operating systems:

- Microsoft Windows Server 2003 (32-bit and 64-bit extended)
- Microsoft Windows Server 2008 (32-bit and 64-bit extended)
- Microsoft Windows Server 2008 R2 (32-bit and 64-bit extended)
- Microsoft Windows Vista (32-bit and 64-bit extended)
- Microsoft Windows 7 (32-bit and 64-bit extended)
- Microsoft Windows Server 2008 R2 Hyper-V
- Linux (32-bit and 64-bit extended)
- MS-DOS
- ESX Server (VMware)
- Citrix XenServer

Chapter 2

Installing the Hardware

This chapter describes how to install the AT-2973SX, AT-2973T, and AT-2973T/4 adapters in a PC and discusses the following topics:

- ❒ “Reviewing the Contents of Your Shipment” on page 28
- ❒ “Reviewing Safety Precautions” on page 29
- ❒ “Pre-Installation Checklist” on page 31
- ❒ “Replacing the Bracket” on page 32
- ❒ “Installing a Network Adapter Card” on page 34
- ❒ “Connecting the Network Cables” on page 38

Reviewing the Contents of Your Shipment

The following items are included with your adapter:

- Antistatic bag (used for protecting the adapter when stored or shipped). Keep the adapter in its packaging until ready for installation.
- Low-profile bracket (The low-profile bracket is not included with the AT-2973T/4 adapter.)
- Standard bracket

Inform your network supplier of any missing or damaged items. If you need to return the adapter, you must pack it in the original (or equivalent) packing material or the warranty will be voided. See “Returning Products” on page 14.

The documentation for these adapters is available in portable document format (PDF) on our web site at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of documents.

Reviewing Safety Precautions

Please review the following safety precautions before you begin to install a network adapter card.

Note
The ☞ indicates that a translation of the safety statement is available in a PDF document titled "Translated Safety Statements" on the Allied Telesis website at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of documents.

Warning
This is a "Class 1 Laser product". ☞ L1

Warning
Do not stare into the laser beam. ☞ L2

Warning
Do not look directly at the fiber optic cable ends or inspect the cable ends with an optical lens. ☞ E29

Warning
Do not work on this equipment or cables during periods of lightning activity. ☞ E2

Note
All Countries: Install this product in accordance with local and National Electric Codes. ☞ E8

Warning
The adapter is being installed in a system that operates with voltages that can be lethal. Before you remove the cover of your system, you must observe the following precautions to protect yourself and to prevent damage to the system components.

- Remove any metallic objects or jewelry from your hands and wrists.
- Make sure to use only insulated or nonconducting tools.
- Verify that the system is powered OFF and unplugged before

accessing internal components.
- Installation or removal of adapters must be performed in a static-free environment. The use of a properly grounded wrist strap or other personal antistatic devices and an antistatic mat is strongly recommended. E39

Pre-Installation Checklist

Before you install an adapter card, do the following:

1. Verify that your system is using the latest BIOS.

   Note
   If you acquired the adapter software from the Allied Telesis support website, enter the path to where the adapter driver files reside on your system.

2. If your system is active, shut it down.
3. When the system shut down is complete, power OFF and unplug your system.
4. Holding the adapter card by the edges, remove it from its shipping package and place it on an antistatic surface.
5. Check the adapter for visible signs of damage, particularly on the card's edge connector.

   Caution
   Do not attempt to install a damaged adapter. If the adapter is damaged, report it to Allied Telesis. See "Contacting Allied Telesis" on page 14.

Replacing the Bracket

Both the AT-2973SX and AT-2973T adapters are shipped with the low-profile bracket attached to the adapter. In addition, the standard bracket is included in the shipment. Depending on your PC, you may need to replace the bracket attached to your adapter.

Note
The AT-2973T/4 adapter is shipped with a standard bracket attached to the card. A low-profile bracket is not included with this adapter.

The following procedure describes how to remove the low-profile bracket from the adapter and replace it with the standard bracket. You can also use this procedure to remove the standard bracket and replace it with the low-profile bracket.

To replace the low-profile bracket with the standard bracket, do the following:

1. Remove the screws that attach the bracket to the adapter. See Figure 7.

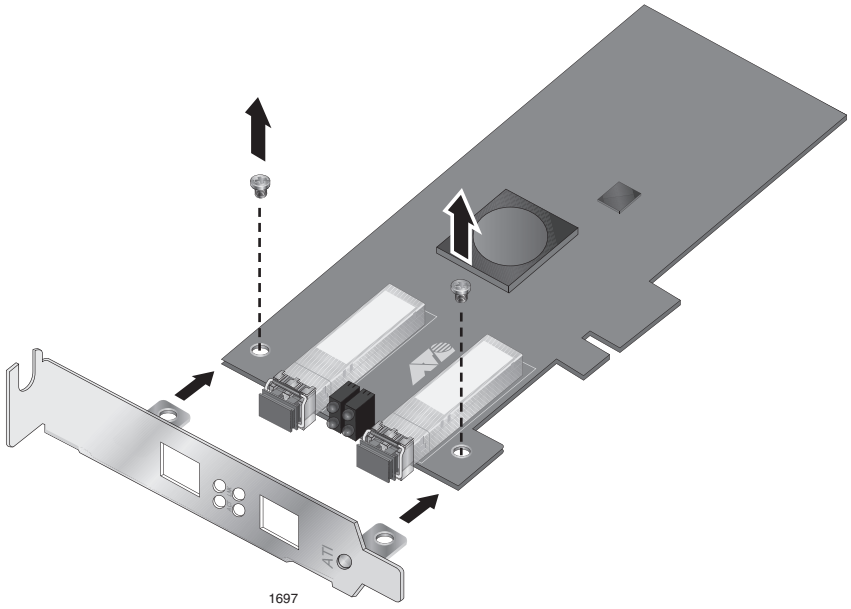

Figure 7. Removing the Low-Profile Bracket

2. Align the tabs of the standard bracket with the holes on the adapter and fasten the screws onto the adapter. See Figure 8.

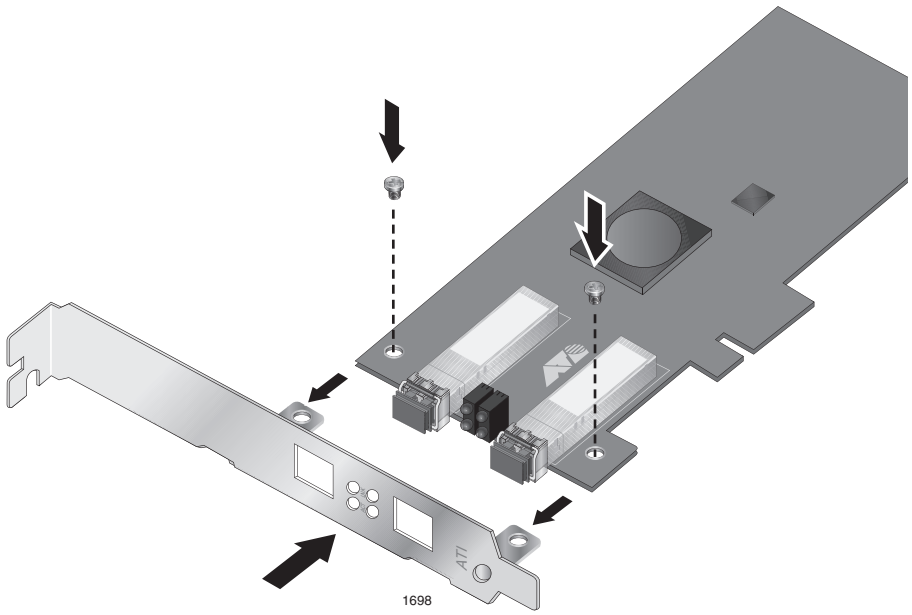

Figure 8. Fastening Screws onto Standard Bracket

Installing a Network Adapter Card

The following instructions apply to installing the AT-2973SX, AT-2973T, and AT-2973T/4 adapters in most systems. For details about performing these tasks on your particular system, refer to the manuals that were supplied with your system.

Note
To perform this procedure, you need to supply a Phillips-head screw.

Note
The AT-2973SX, AT-2973T, and AT-2973T/4 adapters require a PCIe x4 PC.

To install an AT-2973SX, AT-2973T, or AT-2973T/4 adapter, do the following:

1. Review the “Pre-Installation Checklist” on page 31 and “Reviewing Safety Precautions” on page 29.

   Before installing the adapter, ensure the system power is OFF and unplugged from the power outlet, and that proper electrical grounding procedures have been followed.

Warning
High voltage inside the system presents a safety hazard. Make sure the power is off before removing the cover.

2. Remove the system cover and select any appropriate empty PCI slot. See Figure 9 on page 35.

   If you do not know how to identify an appropriate PCI slot, refer to the system documentation that was included with your PC.

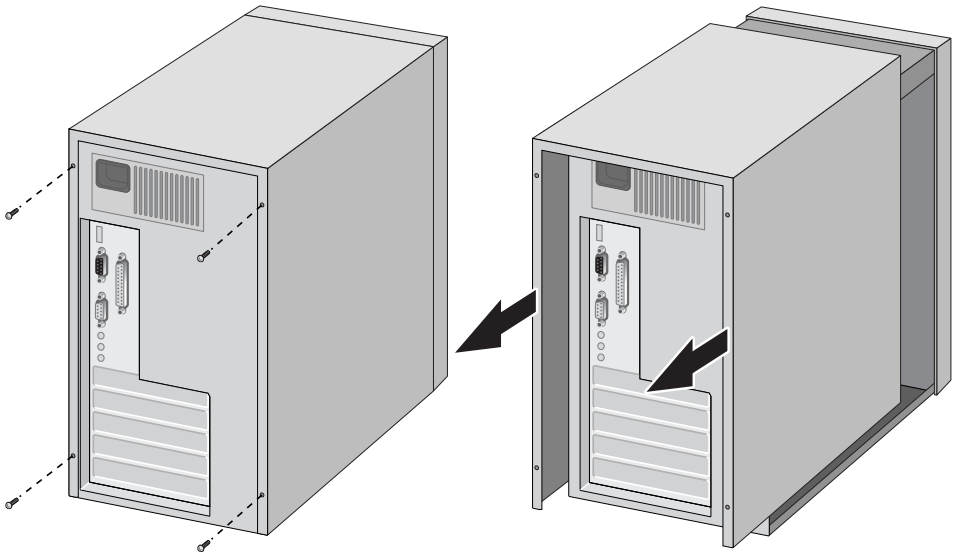

Figure 9. Removing the PC Cover

3. Select an empty, non-shared PCI slot and remove the faceplate.

   Keep the faceplate in a safe place. You may need it for future use. See Figure 10.

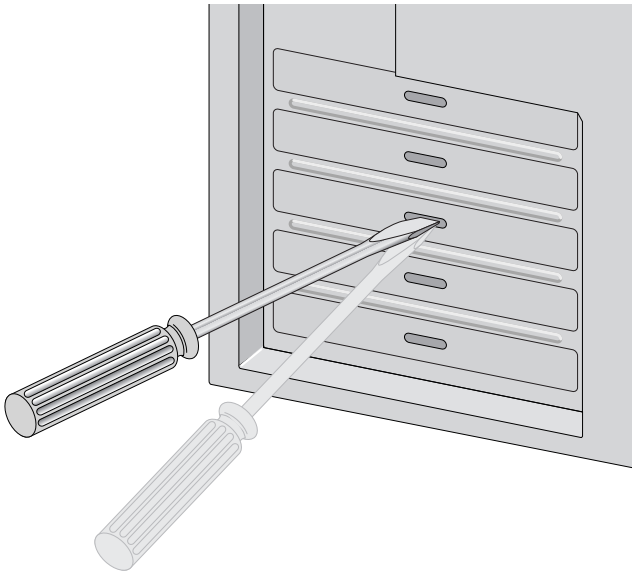

Figure 10. Removing the Faceplate From PCI Slot

Note
If you cannot locate or do not know how to find an appropriate PCI slot, refer to the documentation that came with your system.

4. Remove the network adapter card from the shipping package and store the packaging material in a safe location.

Caution
Wear a grounding device and observe electrostatic discharge precautions when installing the network adapter card in a system. Failure to observe this caution could result in damage to the card.

5. Applying even pressure at both corners of the card, push the adapter card until it is firmly seated in the appropriate PCI slot.

   Make sure the card is securely seated. To insert the network adapter card, see Figure 11.

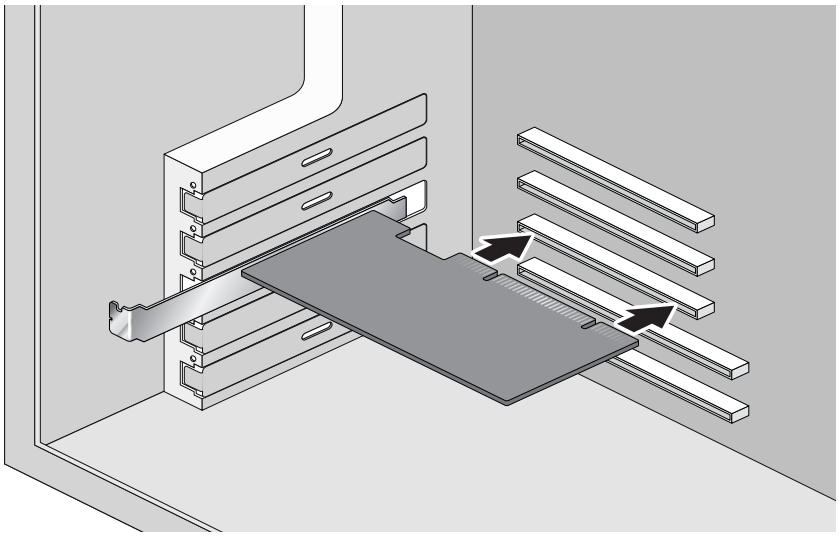

Figure 11. Inserting the Adapter with a High-profile Bracket

Caution
Do not use excessive force when seating the card, because this may damage the system or the adapter. If the card resists seating, remove it from the system, realign it, and try again.

6. Secure the network adapter card to the chassis with a Phillips-head screw (not provided). See Figure 12 on page 37.

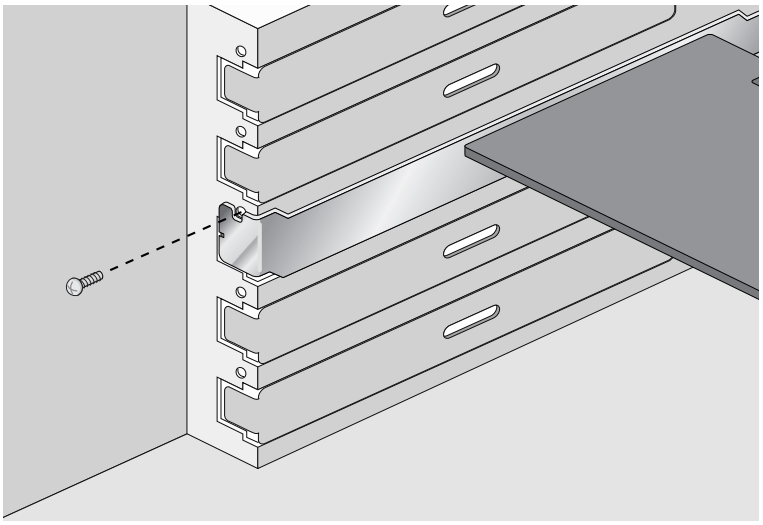

Figure 12. Securing the Adapter with a High-profile Bracket

7. Replace the system's cover and secure it with the screws removed in Step 2.

8. Disconnect any personal antistatic devices.

9. Power the system on.

   Once the system returns to proper operation, the adapter hardware is fully installed. Next, connect the network cables. See "Connecting the Network Cables" on page 38.

Connecting the Network Cables

After you install the adapter in your PC, attach the system to a compatible link partner or an IEEE 802.3z compliant Gigabit Ethernet switch.

The AT-2973SX adapter has two fiber optic connectors, each with a transmit and receive connector. This adapter requires a fiber optic cable. For cable specifications, see the AT-2973SX adapter data sheet.

Note
For information about cleaning a fiber optic connector, see Appendix B “Cleaning Fiber Optic Connectors” on page 171.

The AT-2973T adapter has two twisted-pair connectors and the AT-2973T/4 adapter has four twisted-pair connectors. Both adapters require twisted-pair cables. For pin signals and pinout information, see “10/100/1000Base-T Twisted-Pair Port Connectors” on page 168.

To connect the network cables to an AT-2973SX, AT-2973T, or AT-2973T/4 adapter, do the following:

Warning
The fiber optic ports contain a Class 1 laser device. When the ports are disconnected, always cover them with the provided plug. Exposed ports may cause skin or eye damage. L4

1. Connect one end of the cable to the adapter.
   - For the AT-2973SX adapter, use a fiber optic cable.
   - For the AT-2973T and AT-2973T/4 adapters, use a twisted-pair cable.
2. For the AT-2973SX adapter, connect the other end of the cable to the appropriate Ethernet fiber optic port. For the AT-2973T and AT-2973T/4 adapters, connect the other end of the cable to another twisted pair port.

Note
After the cable is properly connected at both ends, the adapter port LEDs should be functional. See “AT-2973SX Adapter Physical Description” on page 17, “AT-2973T Adapter Physical Description” on page 18, or “AT-2973T/4 Adapter Physical Description” on page 21 for a description of LED operation for each adapter model.

After you connect the system to the network and power is supplied, the AT-2973SX, AT-2973T, and AT-2973T/4 adapters attempt to establish the connection at 1000 Mbps in full-duplex mode.

Chapter 3

Installing Broadcom Boot Agent Driver Software

This chapter provides information about how to install the Broadcom Boot Agent Driver Software and discusses the following topics:

- ❒ “Overview” on page 42
- ❒ “Setting Up MBA in a Client Environment” on page 43
- ❒ “Setting Up MBA in a Server Environment: Red Hat Linux PXE Server” on page 45

Overview

The AT-2973SX, AT-2973T, and AT-2973T/4 NetXtreme II Family adapters support Preboot Execution Environment (PXE). Multi-Boot Agent (MBA) is a software module that allows your network computer to boot with the images provided by remote servers across the network. The Broadcom MBA driver complies with PXE 2.1 code.

The MBA module operates in a client/server environment. A network consists of one or more boot servers that provide boot images to multiple computers through the network. The Broadcom implementation of the MBA module has been tested successfully in the following environments:

- **Linux Red Hat PXE Server**. Broadcom PXE clients are able to remotely boot and use network resources (NFS mount, and so forth) as well as perform Linux installations. In the case of a remote boot, the Linux universal driver binds seamlessly with the Broadcom Universal Network Driver Interface (UNDI) and provides a network interface in the Linux remotely-booted client environment.
- **Intel APITEST**. The Broadcom PXE driver passes all API compliance test suites.
- **MS-DOS UNDI**. The MS-DOS Universal Network Driver Interface (UNDI) seamlessly binds with the Broadcom UNDI to provide a network adapter driver interface specification (NDIS2) interface to the upper layer protocol stack. This allows computers to connect to network resources in an MS-DOS environment.
- **Remote Installation Service (RIS)**. The Broadcom PXE clients are able to remotely boot to a Windows Server 2003 (SP1 and older) system running RIS to initialize and install Windows Server 2003 and prior operating systems. To extend functionalities beyond basic network connectivity when loading an operating system through RIS, see “Using the NetXtreme II Monolithic Driver” on page 48.
- **Windows Deployment Service (WDS)**. For Windows Server 2003 SP2, RIS was replaced by WDS, which offers a Broadcom PXE client to install Windows operating systems, including Windows Vista, Windows Server 2008 and Windows Server 2008 R2. To extend functionalities beyond basic network connectivity when loading an operating system through WDS, see “Using the NetXtreme II Monolithic Driver” on page 48.
- **Automated Deployment Service (ADS)**. The Broadcom PXE client can connect to a Windows Server 2003 system and run a deployment agent that allows one to perform some administrative functions, including, but not limited to, deploying a Windows Server 2003 image. To extend functionalities beyond basic network connectivity when loading an operating system through ADS, see “Using the NetXtreme II Monolithic Driver” on page 48.

Setting Up MBA in a Client Environment

Setting up a Multiple Book Agent (MBA) in a client environment involves the following:

- ❒ "Enabling the MBA Driver" on page 43
- ❒ "Configuring the MBA Driver" on page 43
- ❒ "Setting Up the BIOS" on page 44

Enabling the MBA Driver

To enable or disable the MBA driver, do the following:

1. Boot up your system in DOS mode.

   Note
   The uxdiag.exe file is included in when you download the driver software files from the Allied Telesis web site.

2. Enter the following:

   `uxdiag -mba [ 0-disable | 1-enable ] -c` *devnum*

   where

   devnum is the specific device(s) number (0,1,2, ...) to be programmed.

Configuring the MBA Driver

This procedure describes how to configure the MBA driver on the AT-2973SX, AT-2973T, and AT-2973T/4 adapters.

To configure the MBA driver, do the following:

Note
You can use the MBA Configuration Menu to configure the MBA driver one adapter at a time as described below, or you can use the MS-DOS based application to simultaneously configure the MBA driver for multiple adapters. See Chapter 12, "User Diagnostics" on page 155.

1. Restart your system.

   You are prompted to press CTRL +S.

2. Press CTRL+S within 4 seconds after the prompt is displayed.

Note
The message prompting you to press CTRL+S is displayed once for each Broadcom NetXtreme II adapter you have in your system that has MBA enabled. The messages are displayed in the same order as the assigned adapter device number.

3. Use the UP ARROW and DOWN ARROW keys to move to the Boot Protocol menu item.

Note
If you have multiple adapters in your system and you are unsure which adapter you are configuring, press CTRL+F6, which causes the port LEDs on the adapter to start blinking.

4. Use the UP ARROW, DOWN ARROW, LEFT ARROW, and RIGHT ARROW keys to move to and change the values for other menu items, as desired.
5. Press F4 to save your settings.
6. Press ESC when you are finished.

Setting Up the BIOS

To boot from the network with the MBA, make the MBA enabled adapter the first bootable device under the BIOS. This procedure depends on the system BIOS implementation. Refer to the user manual for the system BIOS implementation for instructions.

Setting Up MBA in a Server Environment: Red Hat Linux PXE Server

The Red Hat Enterprise Linux distribution has PXE Server support. It allows users to remotely perform a complete Linux installation over the network. The distribution comes with the boot images boot *kernel* (vmlinuz) and *initial ram disk* (initrd), which are located on the Red Hat disk#1:

```
/images/pxeboot/vmlinuz
/images/pxeboot/initrd.img
```

Refer to the Red Hat documentation for instructions on how to install PXE Server on Linux.

However, the Initrd.img file distributed with Red Hat Enterprise Linux, does not have a Linux network driver for the Broadcom NetXtreme II adapters. This version requires a driver disk for drivers that are not part of the standard distribution. You download the driver software files from the Allied Telesis web site.

Chapter 4

Installing the Monolithic Software Driver

A monolithic driver allows you to download an image of a PC onto an image server and then to another PC with an adapter installed. Often, multiple images are downloaded. The NetXtreme II Monolithic software driver allows remote installation of an image of a PC with an AT-2973SX, AT-2973T, or AT-2973T/4 adapter installed. This chapter describes how to install the monolithic driver software for remote installation and discusses the following topics:

- ❒ “Using the NetXtreme II Monolithic Driver” on page 48
- ❒ “Inserting the NetXtreme II Monolithic Driver in a WinPE 2.0 Image” on page 50
- ❒ “Configuring the Speed and Duplex Settings” on page 52

Using the NetXtreme II Monolithic Driver

The NetXtreme II Monolithic driver is used with a remote imaging software such as WinPE, although it is not associated with any operating system. Before you install a monolithic driver, you must install an AT-2973SX, AT-2973T, or AT-2973T/4 adapter in a PC (or multiple PCs) that you want to act as a remote node. Once you install the adapter and the monolithic driver software, your can download the image from an image server to the PCs with an installed adapter.

The NetXtreme II Family Adapters, based on its advanced functionalities, uses a software architecture that includes a Virtual Bus Device (VBD) to extend functionalities beyond basic network connectivity. However, Microsoft, does not currently support this architecture when loading an operating system through its Windows Deployment Services (WDS), which was previously known as Remote Installation Services (RIS), or for the deployment agent used in the Automated Deployment Services (ADS). Therefore, a separate driver was created to accommodate these Microsoft deficiencies. This driver is known as the NetXtreme II monolithic driver, but it is sometimes referred to as the RIS driver.

The NetXtreme II monolithic driver was developed to work only for the text mode portion of a WDS legacy installation and to establish connectivity with a deployment agent for ADS. It is not intended to be used as a driver loaded in the running state of an operating system. The exception to this is the Windows Preinstallation Environment (WinPE).

For WDS, this driver is used similarly to any other network adapter driver for supporting network connectivity after the PXE boot to the WDS server. When placed in the I386 or AMD64 directory (depending on the version of the operating system being deployed), the monolithic driver is called to establish that there is driver support for the NetXtreme II Family Adapter included in the WDS legacy image.

For ADS, the driver is placed in the PreSystem directory on the server running ADS to establish connectivity with the deployment agent on remote systems with NetXtreme II adapters when booting from PXE.

While Windows PE 2005 natively supports the VBD architecture, it was found that using the *minint* switch in the startnet.cmd file does not. The minint switch performs a limited scan of the system bus to identify network devices only and, therefore, does not support the VBD architecture. Since only network connectivity is required in Windows PE, the only supported driver is the monolithic driver for the NetXtreme II Family adapter in this environment as well. Place the b06nd.inf file in the INF directory within the Windows PE image, and place the appropriate driver file (b06nd51a.sys for x64-based builds or b06nd51.sys for x86-based builds) in the driver's

directory. If Windows PE is deployed as a flat image from a RIS or WDS server, you must also place both the b06nd.inf and the appropriate driver file in the I386 or AMD64 directory containing the image.

Inserting the NetXtreme II Monolithic Driver in a WinPE 2.0 Image

By default, the monolithic driver is not included in the boot.wim and install.wim files that come with the Windows Vista, Windows Server 2008, and Windows Server 2008 R2 Operating Systems. Microsoft's Windows Automated Installation Kit (AIK) allows you to modify the default boot.wim and install.wim files and create WinPE 2.0 images to include the NetXtreme II monolithic driver in the Windows Vista, Windows Server 2008, and Windows Server 2008 R2 installation.

To insert Broadcom's NetXtreme II monolithic driver in a WinPE 2.0 image (for Windows Vista, Windows Server 2008, and Windows Server 2008 R2), download AIK from www.microsoft.com/downloads/Search.aspx?displaylang=en, type in “automated install kit” in the Search field. Then install AIK.

After installing AIK, copy the latest monolithic driver to a directory on the local hard drive of the system you installed the AIK. Follow the procedure below to insert the monolithic driver into a WinPE 2.0 boot image.

> **Note**
> The directory structure c:\VistaPEx86 is used throughout this procedure.

To insert the monolithic driver into a WinPE 2.0 boot image, do the following:

1. Download the monolithic driver files, b06nd.inf and b06nd.sys.

   Go to the Allied Telesis website at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of files.

2. From All Programs, open Windows AIK and select **Windows PE Tools Command prompt**.

3. At the command prompt, run the copype.cmd script. The script requires two arguments: hardware architecture and destination location. The command syntax is:

   ```
   copype.cmd <arch> <destination>
   ```

   For example: copype x86 c:\VistaPEx86

4. Mount the base image to a local directory so that you can add or remove packages by entering:

   ```
   imagex /mountrw c:\VistaPEx86\winpe.wim 1
   c:\VistaPEx86\mount
   ```

5. Place the monolithic driver and inf file in c:\drivers\x32\ by entering:

   ```
   peimg /inf=c:\Drivers\x32\b06nd.inf
   c:\VistaPEx86\mount\windows
   ```

   AIK inserts the driver into the WinPE 2.0 image.

6. To complete the customization of the image, prepare the image for deployment, enter:

   ```
   peimg /prep c:\VistaPEx86\mount\windows
   ```

7. When asked to continue and have the program prepare the image for deployment, enter:

   ```
   yes
   ```

8. To commit the changes to the original image file (Winpe.wim), enter:

   ```
   imagex /unmount c:\VistaPEx86\mount /commit
   ```

9. To replace the default Boot.wim file in the \ISO directory with your new custom image, enter:

   ```
   copy c:\VistaPex86\winpe.wim
   c:\VistaPEx86\ISO\sources\boot.wim
   ```

Configuring the Speed and Duplex Settings

Since the typical environment where the NetXtreme II monolithic driver is used does not provide the means to configure advanced network adapter properties, the driver file (b06nd.inf) was modified to include a section that allows it to be configured for a specific speed and duplex mode. This provides a more robust connection to the network as it allows the adapter to match the settings of its link partner (for example, a switch or a router).

To manually configure the speed and duplex, do the following:

1. Open the b06nd.inf file with a text editor like Microsoft Notepad or WordPad.

2. Search the file for *Registry parameters* to locate the section that allows you to configure the adapter speed and duplex mode.

   Once located, notice the following information:

   ```
   [params_utp]

   hkr, , req_medium,          2, "0"

   [params_fiber]

   hkr, , req_medium,          2, "65283"
   ```

   These are two separate sections that can be configured: one for standard RJ-45 copper interfaces (params_utp) and one for fiber devices (params_fiber).

3. As described in the file, replace the value above in quotation marks under the correct section, depending upon the network adapter in your system. The available values are shown below.

   Options for copper interfaces:

   – Auto (1 Gbps is enabled when that speed is supported) = "0"

   – 10 Mbps Half Duplex = "65794"

   – 10 Mbps Full Duplex = "258"

   – 100 Mbps Half Duplex = "66050"

   – 100 Mbps Full Duplex = "514"

Options for fiber interfaces:

- Auto (1 Gbps is enabled when that speed is supported) = "0"
- 1 Gbps Full Duplex = "771"
- Auto with 1 Gbps Fallback = "33539"
- Hardware default = "65283"

The following example shows how to configure a copper interface for a 10 Mbps Full Duplex connection:

```
hkr, , req_medium,          2, "258"
```

Chapter 5

Installing the NDIS2 Driver Software

This chapter provides procedures to install the NDIS2 driver on the Microsoft Network Client and DOS NDIS platforms.

This chapter discusses the following topics:

- ❒ “Overview” on page 56
- ❒ “Checking Pre-installation Requirements” on page 57
- ❒ “Installing the NDIS2 Driver Software on MS-DOS Platforms” on page 58
- ❒ “Using Keywords for the Drivers” on page 63

Overview

The BXND20X Broadcom NetXtreme II Gigabit Ethernet driver is described in this chapter. This driver can be installed on AT-2973SX, AT-2973T, and AT-2973T/4 adapters that are installed in systems running an MS-DOS platform. See the following sections:

- ❒ “Checking Pre-installation Requirements” on page 57
- ❒ “Installing the NDIS2 Driver Software on MS-DOS Platforms” on page 58
- ❒ “Using Keywords for the Drivers” on page 63

Checking Pre-installation Requirements

Before you can successfully install the NDIS2 driver software, you must do the following:

- Physically install the network adapter in the server.
- Install the networking software that is appropriate to the operating system (such as Microsoft LAN Manager 2.2 for MS-DOS). The networking software must be running on your server.

Installing the NDIS2 Driver Software on MS-DOS Platforms

The NDIS2 driver software can be run from an MS-DOS startup disk using Microsoft Network Client 3.0 or from the hard disk using Microsoft LAN Manager 2.2.

This section describes how to create a startup disk and modify it. See the following:

- ❒ “Creating a Startup Disk” on page 58
- ❒ “Modifying the Startup Disk” on page 59

Creating a Startup Disk

To create a startup disk to run a Microsoft Network client, you must have the following:

- ❒ Windows NT Server 4.0 CD-ROM
- ❒ A blank MS-DOS system disk (3.5" high-density floppy disk)
- ❒ Access to the Broadcom NDIS2 driver file (BXND20X.dos). This file is located on the driver source media.

After creating the startup disk, follow the instructions in “Modifying the Startup Disk” on page 59.

> **Note**
> Windows NT Server 4.0 users: When running Setup for Microsoft Network Client v3.0 for MS-DOS, click any network card from the list (NE2000 Compatible, for example) to create the startup disk.

To create a startup disk, do the following:

1. Create a folder called NCADMIN in the root of the C drive.
2. Copy the NCADMIN.CN_, NCADMIN.EX_, and NCADMIN.HL_ files from the I386 folder on the Windows NT Server 4.0 CD-ROM.
3. Open a command prompt window and change the directory to C:\NCADMIN.
4. Enter the following:

   ```
   expand -r ncadmin.*
   ```

5. Close the command prompt window by typing `exit` and then pressing Enter.
6. Start Windows Explorer.

7. Open the NCADMIN folder and double-click **ncadmin.exe**.

8. Follow the on-screen instructions to make the network startup disk (choose **NE2000 Compatible** from the list of adapters).

Modifying the Startup Disk

To modify the startup disk, do the following:

1. Edit A:\Net\Protocol.ini with Notepad or a similar text editor.

   a. Change DriverName=$ to DriverName=BXND20X$.

   b. Remove all other parameter entries under the [MS$NE2CLONE] or equivalent section such as IOBASE=0x300 or INTERRUPT=3, and so on.

   Example Protocol.ini file for IP

   The following is an example of an protocol.ini file for IP:

```
[network.setup]
version=0x3110
netcard=ms$ne2clone,1,MS$NE2CLONE,1
transport=tcpip,TCPIP
lana0=ms$ne2clone,1,tcpip
[MS$NE2CLONE]
DriverName=BXND20X$
[protman]
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP
[tcpip]
NBSessions=6
DefaultGateway=0
SubNetMask=255 0 0 0
IPAddress=192 168 0 1
DisableDHCP=0
DriverName=TCPIP$
BINDINGS=MS$NE2CLONE
LANABASE=0
```

   Example Protocol.ini file for NetBEUI

   The following is an example of an protocol.ini file for NetBEUI:

```
[network.setup]
version=0x3110
netcard=ms$ne2clone,1,MS$NE2CLONE,1
transport=ms$ndishlp,MS$NDISHLP
transport=ms$netbeui,MS$NETBEUI
lana0=ms$ne2clone,1,ms$ndishlp
lana1=ms$ne2clone,1,ms$netbeui
[MS$NE2CLONE]
```

```
DriverName=BXND20X$
[protman]
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP
[MS$NDISHLP]
DriverName=ndishlp$
BINDINGS=MS$NE2CLONE
[MS$NETBEUI]
DriverName=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=MS$NE2CLONE
LANABASE=0
```

2. Edit A:\Net\System.ini.
3. Change `netcard=` to `netcard=BXND20X.dos`.
4. Check for references to C:\NET and change `C:\NET` to `A:\NET` if necessary.

   Example system.ini file

   The following is an example of a system.ini file:

```
[network]
sizworkbuf=1498
filesharing=no
printsharing=no
autologon=yes
computername=MYPC
lanroot=A:\NET
username=USER1
workgroup=WORKGROUP
reconnect=yes
dospophotkey=N
lmlogon=0
logondomain=
preferredredir=basic
autostart=basic
maxconnections=8
[network drivers]
netcard=BXND20X.dos
transport=ndishlp.sys,*netbeui
devdir=A:\NET
LoadRMDrivers=yes
```

5. Copy **BXND20X.dos** to A:\Net.

6. Create the appropriate Autoexec.bat file in drive A for the chosen protocol as shown:

   TCP/IP

   Here is an example of the TCP/IP autoexec.bat file:

   ```
   path=a:\net
   a:\net\net initialize
   a:\net\netbind.com
   a:\net\umb.com
   a:\net\tcptsr.exe
   a:\net\tinyrfc.exe
   a:\net\nmtsr.exe
   a:\net\emsbfr.exe
   a:\net\net start basic
   net use z: \\SERVERNAME\SHARENAME
   ```

   NetBEUI

   Here is an example of the NetBEUI autoexec.bat file:

   ```
   SET PATH=A:\NET
   A:\NET\NET START BASIC

   net use z: \\SERVERNAME\SHARENAME
   ```

7. Create a Config.sys file on the startup disk in drive A as shown:

   ```
   files=30
   device=a:\net\ifshlp.sys
   lastdrive=z
   ```

Installing the DOS NDIS2 Driver Software

To install the DOS NDIS2 Driver Software on the hard disk, do the following:

1. Verify that the system has Microsoft LAN Manager 2.2 installed, with a protocol such as NetBEUI configured.

2. Create a folder on your hard disk to store the NDIS 2.01 driver.

   ```
   Example: C:\LANMAN
   ```

3. Copy the **BXND20X.dos** file to this folder.

4. Edit the **Config.sys** file by adding the following lines:

   ```
   DEVICE = C:\LANMAN\PROTMAN.DOS
   DEVICE = C:\LANMAN\BXND20X.DOS
   DEVICE = C:\LANMAN\NETBEUI.DOS
   ```

5. Edit the Autoexec.bat file by adding the following lines:

   ```
   C:\ LANMAN\NETBIND.EXE
   C:\LANMAN\NET START WORKSTATION
   C:\LANMAN\NET USE drive letter: \\server
   name\resource name
   ```

6. Edit the **Protocol.ini** file (located in C:\LANMAN) to configure the driver to bind with NetBEUI or any other protocols.

   Here is an example:

   ```
   [PROTOCOL MANAGER]
   DriverName = PROTMAN$
   [NETBEUI_XIF]
   DriverName = netbeui$
   BINDINGS = BXND20X
   [BXND20X]
   DriverName = "BXND20X$"
   ```

7. Restart the computer to complete the installation.

Note
The driver loads during system configuration and displays the Broadcom banner, controller name, MAC address, IRQ number, detected line speed, and the controller BusNum and DevNum. If the driver fails to load, an *initialization fail* message is displayed. For more information about the BusNum and DevNum keywords, see “Using Keywords for the Drivers” on page 63.

Using Keywords for the Drivers

The Protocol.ini file contains certain keywords that are used by the BXND20X.dos driver. These keywords are listed below:

- **BusNum**. Specifies the number of the PCI bus on which the network adapter is located. This keyword requires a value ranging from 0 to 255.
- **DevNum**. Specifies the device number assigned to the network adapter when it is configured by the PCI BIOS. This keyword requires a value ranging from 0 to 255.
- **FuncNum** or **PortNum**. Specifies the PCI function or port number assigned to the network controller. This keyword requires a value ranging from 0 to 7.

Note
The BusNum, DevNum, and FuncNum (or PortNum) keywords are needed when multiple adapters are installed in the server and when a specific controller must be loaded in a certain order. These keywords are used concurrently and are included for manufacturing purposes. Do not use them unless you are familiar with how to configure PCI devices. A PCI device scan utility is needed to find this information.

- **LineSpeed**. Specifies the speed of the network connection in Mbit/s. The values are 10, 100, or 1000 Mbit/s. Technically, a line speed of 1000 Mbit/s cannot be forced and is achievable only through auto-negotiation. For the sake of simplicity, the driver performs auto-negotiation when the line speed is set to a value of 1000.
- **Duplex**. Specifies the duplex mode of the network adapter. Requires a setting of either **Half** or **Full**. When this keyword is used, the **LineSpeed** keyword must also be used. If neither keyword is used, the network adapter defaults to auto-negotiation mode.
- **NodeAddress**. Specifies the network address used by the network adapter. If a multicast address or a broadcast address is specified, the adapter uses the default MAC address.
- **FixCheckSumOff**. Turns off the driver's workaround for the TCP/IP stack to recognize the 1s complemented version of the checksum.
- **AcceptAllMC**. Informs the driver to deliver all multicast packets to the upper protocol.

See below for an example of the keywords:

```
[BXND20X]
DriverName = "BXND20X$"
BusNum = 3
DevNum = 14
PortNum = 2
LineSpeed = 1000
Duplex = Full
NodeAddress = 001020304050
```

Chapter 6

Installing the Linux Drivers

This chapter provides procedures to install the Linux drivers for the AT-2973SX, AT-2973T, and AT-2973T/4 adapters.

This chapter discusses the following topics:

- “Overview” on page 66
- “Installing Linux Driver Software” on page 68

Overview

This chapter discusses the Linux drivers for the Broadcom NetXtreme II network adapters and describes how to install them. For a description of the drivers, see Table 4.

Table 4. Broadcom NetXtreme II Linux Drivers

Linux Driver	Description
bnx2 cnic	Indicates the Linux drivers for the AT-2973SX AT-2973T, and AT-2973T/4 network adapters. The bnx2 driver is the networking driver and the cnic driver supports additional features required by the bnx2i iSCSI offload driver. The bnx2i iSCSI driver is packaged separately.
bnx2i	Indicates the Linux driver that enables iSCSI offload on the AT-2973SX, AT-2973T, and AT-2973T/4 network adapters.

Limitations

This section describes the testing limitations of the following Linux drivers:

- “bnx2 Driver” on page 66
- “bnx2i Driver” on page 67

bnx2 Driver

The current version of the driver has been tested on 2.4.x kernels (starting from 2.4.24) and all 2.6.x kernels. The driver may not compile on kernels older than 2.4.24.

Testing is concentrated on i386 and x86_64 architectures. Only limited testing has been done on other architectures. You may need to make minor changes to some source files and the Makefile on some kernels. In addition, the Makefile does not compile the cnic driver on kernels older than 2.6.16. iSCSI offload is only supported on 2.6.16 and newer kernels.

Support for the 2.4.21 kernels is provided in Red Hat Enterprise Linux 3.

bnx2i Driver

The current version of the driver has been tested on 2.6.x kernels, starting from 2.6.18 kernel. The driver may not compile on older kernels with the exception of SLES 10 SP1, which runs the 2.6.16.46 kernel. SUSE upgraded the iscsi_transport kernel module in SLES 10 SP1. In addition, Broadcom iSCSI offload initiators is supported on SLES 10 SP1. Testing is concentrated on i386 and x86_64 architectures, Red Hat EL5, and SUSE 10 SP1 distributions.

Packaging

The Linux driver is released in the packaging formats shown in Table 5. The NetXtreme2 package contains the bnx2 (1 Gb network adapter) and drivers for source RPM and compressed tar.

Table 5. Linux Driver Packaging

Format	bnx2 Driver	bnx2i (iSCSI) Driver
Source RPM	netxtreme2-version.src.rpm	bnx2i-*version*.src.rpm
Compressed tar	netxtreme2-version.tar.gz	bnx2i-*version*.tar.gz
Supplemental tar	netxtreme2_sup-version.tar.gz	bnx2i_sup-*version*.tar.gz

Identical source files to build the driver are included in both RPM and TAR source packages. The supplemental tar file contains additional utilities such as patches and driver diskette images for network installation.

The following updated open-iSCSI components are released in source RPM format:

- iscsi-initiator-utils-6.2.0.868-0.7c.src.rpm: updated open-iscsi for Red Hat 5 distributions
- open-iscsi-2.0.707-0.25b.src.rpm: updated open-iscsi components for SLES 10 SP1 distribution
- open-iscsi-2.0.707-0.44b.src.rpm: updated open-iscsi components for SLES 10 SP2 distribution

Installing Linux Driver Software

There are two ways to install the Linux driver software— from the Source RPM Package or build the driver from the source TAR file. See the following sections:

- ❒ “Installing the Source RPM Package” on page 68
- ❒ “Building the Driver from the Source TAR File” on page 70

Note
If a bnx2 or bnx2i driver is loaded and you update the Linux kernel, you must recompile the driver module if it was installed using the source RPM or the TAR package.

Installing the Source RPM Package

The procedure in this section describes how to install the Source RPM Package. The examples in the following procedure refer to the bnx2 driver, but also apply to the bnx2i driver.

To install the Source RPM Package, do the following:

1. Enter the following command:

   ```
   rpm -ivh netxtreme2-version.src.rpm
   ```

2. Change the directory to the RPM path and build the binary driver for your kernel (the RPM path is different for each Linux distribution):

   ```
   cd /usr/src/redhat,OpenLinux,turbo,packages,rpm ...

   rpm -bb SPECS/bnx2.spec
   ```

   or

   ```
   rpmbuild -bb SPECS/bnx2.spec (for RPM version 4.x.x)
   ```

Note
During your attempt to install a source RPM package, the following message may be displayed: `error: cannot create %sourcedir /usr/src/redhat/SOURCES`
The most likely cause of the error is that the rpm-build package has not been installed. Locate the rpm-build package on the Linux installation media and install it using the following command: `rpm -ivh rpm-build-version.arch.rpm`
Then complete the installation of the source RPM.

3. Install the newly built package which includes the driver and man page:

   `rpm -ivh RPMS/i386/bnx2-`*`version`*`.arch.rpm`

   If you are installing over an existing distribution that may already contain an older version of the driver, the —force option is needed.

   Depending on the kernel, the driver is installed to one of the following paths:

   2.4.x kernels

   ```
   /lib/modules/kernel_version/kernel/drivers/net/
   bnx2.o
   ```

   2.6.x kernels

   ```
   /lib/modules/kernel_version/kernel/drivers/net/
   bnx2.ko
   ```

   For the bnx2i driver, the driver is installed on one of the following paths:

   – **2.6.16 kernels and newer (bnx2 driver)**

   ```
   /lib/modules/kernel_version/kernel/drivers/
   net/bnx2.ko

   /lib/modules/kernel_version/kernel/drivers/
   net/cnic.ko
   ```

   – **2.6.16 kernels and newer (bnx2i driver)**

   ```
   /lib/modules/kernel_version/kernel/drivers/
   iscsi/bnx2i.ko
   ```

4. To load the driver, enter one of the following commands:

   ```
   insmod bnx2
   ```

   or

   ```
   modprobe bnx2
   ```

5. To load the cnic driver (if applicable), enter one of the following commands:

   ```
   insmod cnic.ko
   ```

   or

   ```
   modprobe cnic
   ```

To configure the network protocol and address, refer to the documentation provided with your operating system.

Building the Driver from the Source TAR File

This procedure describes how to build the bnx2 and bnx2i Linux drivers from the Source TAR file. See the following sections:

- “Building the bnx2 Driver” on page 70
- “Building the bnx2i Driver” on page 71

Building the bnx2 Driver

To build the bnx2 Linux driver from the Source TAR file, do the following:

1. Create a directory and extract the TAR files to the following directory:

   ```
   tar xvzf netxtreme2-version.tar.gz
   ```

2. Build the driver bnx2.ko (or bnx2.o) as a loadable module for the running kernel. Enter the following commands:

   ```
   cd bnx2-version/src
   make
   ```

3. Test the driver by loading it (if necessary, first unload the existing driver). Enter the following commands:

   ```
   rmmod bnx2
   insmod bnx2.o
   modprobe crc32 && insmod bnx2.o
   ```

   or, for Linux 2.6 kernels:

   ```
   rmmod bnx2
   insmod bnx2.ko
   ```

4. Load the cnic driver, if applicable. Enter the following command:

   ```
   insmod cnic.ko
   ```

5. Install the driver and man page by entering the following command:

   ```
   make install
   ```

   Note
   See the “Installing the Source RPM Package” on page 68 for the location of the installed driver.

To configure the network protocol and address after building the driver, refer to the manuals supplied with your operating system.

Building the bnx2i Driver

To build the bnx2i Linux driver from the Source TAR file, do the following:

1. Create a directory and extract the TAR files to the directory by entering the following command:

   ```
   tar xvzf bnx2-version.tar.gz
   ```

2. Build the driver bnx2.ko as a loadable module for the running kernel by entering the following command:

   ```
   cd bnx2i-version/drivermake
   ```

3. Test the driver by loading it (if necessary, first unload the existing driver). Enter the following commands:

   ```
   rmmod bnx2i
   insmod bnx2i.ko
   ```

4. Install the driver and man page, by entering:

   ```
   make install
   ```

   Note
   See the "Installing the Source RPM Package" on page 68 for the location of the installed driver.

5. Install the user daemon (bnx2id), by entering:

   ```
   cd ${DRV_BASE}/driver
   make install_usr
   ```

   The `make install_usr` command installs the bnx2id binary under /sbin.

   To use Broadcom iSCSI, see "Load and Run Necessary iSCSI Software Components" on page 72 to load the necessary software components.

Load and Run Necessary iSCSI Software Components

The Broadcom iSCSI Offload software suite consists of three kernel modules and a user daemon. To load the required software components either manually or through system services, do the following:

1. Unload existing driver and kill the user daemon, if necessary. Do the following:

   Manual:

   ```
   rmmod bnx2i
   pkill -9 bnx2id
   ```

   Using system service:

   ```
   service bnx2id stop
   ```

2. Load the iSCSI driver and the user daemon. Do the following:

   Manual:

   ```
   bnx2id

   insmod bnx2i.ko
   ```

   or

   ```
   modprobe bnx2i
   ```

   Using system service:

   ```
   service bnx2id start
   ```

Unloading the Linux Driver

You can unload, or remove, the Linux Driver from an RPM or TAR installation. See the following:

- ❒ “Unloading the Driver from an RPM Installation” on page 72
- ❒ “Unloading the Driver from a TAR Installation” on page 73

Unloading the Driver from an RPM Installation

This section describes how to unload, or remove, a Linux driver from an RPM installation.

> **Note**
> The examples used in this procedure refer to the bnx2 driver, but also apply to the bnx2i driver.

Note
On 2.6 kernels, it is not necessary to bring down the eth# interfaces before unloading the driver module.

Note
If the cnic driver is loaded, unload the cnic driver before unloading the bnx2 driver.

Note
Before unloading the bnx2i driver, disconnect all active iSCSI sessions to targets.

To unload the driver, use `ifconfig` to bring down all eth# interfaces opened by the driver, and then enter:

```
rmmod bnx2
```

If the driver was installed using the `rpm` command, enter the following command to remove it:

```
rpm -e netxtreme2
```

Unloading the Driver from a TAR Installation

If the driver was installed using make install from the tar file, manually delete the bnx2.o or bnx2.ko driver file from the operating system. See "Installing the Source RPM Package" on page 68 for the location of the installed driver.

Patching PCI Files (Optional)

This is an optional procedure that describes how to patch PCI files for identification by other vendors.

For hardware detection utilities, such as Red Hat kudzu, to properly identify bnx2 supported devices, you may need to update a number of files containing PCI vendor and device information.

Note
The examples used in this procedure refer to the bnx2 driver, but also apply to the bnx2i driver.

Apply the updates by running the scripts provided in the supplemental tar file. For example, on Red Hat Enterprise Linux, apply the updates by entering the following commands:

```
./patch_pcitbl.sh  /usr/share/hwdata/pcitable
pci.updates
/usr/share/hwdata/pcitable.new bnx2

./patch_pciids.sh /usr/share/hwdata/pci.ids
pci.updates
/usr/share/hwdata/pci.ids.new
```

Next, back up the old files and the rename the new files by entering the following copy commands:

```
cp /usr/share/hwdata/pci.ids /usr/share/hwdata/
old.pci.ids

cp /usr/share/hwdata/pci.ids.new /usr/share/hwdata/
pci.ids

cp /usr/share/hwdata/pcitable /usr/share/hwdata/
old.pcitable

cp /usr/share/hwdata/pcitable.new /usr/share/hwdata/
pcitable
```

Network Installations

For network installations through NFS, FTP, or HTTP (using a network boot disk or PXE), a driver disk that contains the bnx2 driver may be needed. The driver disk images for the most recent Red Hat and SuSE versions are included. Boot drivers for other Linux versions can be compiled by modifying the Makefile and the make environment. Further information is available from the Red Hat website at http://www.redhat.com.

Setting Values for Optional Properties

You can set values for optional properties for the bnx2 and bnx2i Linux drivers. See the following sections:

- “Setting Optional Properties for the bnx2 Driver” on page 75
- “Setting Optional Properties for the bnx2i Driver” on page 75

Setting Optional Properties for the bnx2 Driver

The **disable_msi** optional property can be supplied as a command line argument to the insmod or modprobe command. The property can also be set in the `modprobe.conf` command. See the man page for more information.

All other driver settings can be queried and changed using the ethtool utility. See the `ethtool` man page for more information. The ethtool settings do not persist across a reboot or module reload. In addition, you can put the ethtool commands in a startup script, such as /etc/rc.local, to preserve the settings across a reboot.

Note
Some combinations of property values may conflict and result in failures. The driver cannot detect all conflicting combinations.

This property is used to disable Message Signal Interrupts (MSI). The property is valid only on 2.6 kernels that support MSI. This property cannot be used on 2.4 kernels. By default, the driver enables MSI if it is supported by the kernel. It runs an interrupt test during initialization to determine if MSI is working. If the test passes, the driver enables MSI. Otherwise, it uses legacy INTx mode. To set the bnx2 driver, enter one of the following:

```
insmod bnx2.ko disable_msi=1
```

or

```
modprobe bnx2 disable_msi=1
```

Setting Optional Properties for the bnx2i Driver

You can supply the optional parameters **en_tcp_dack**, **error_mask1** and **error_mask2** as command line arguments to the `insmod` or `modprobe` command for the bnx2i driver.

error_mask1 and **error_mask2**

Use "Config FW iSCSI Error Mask #" to configure certain iSCSI protocol violations to be treated either as a warning or a fatal error. All fatal iSCSI protocol violations result in session recovery (ERL 0). These are bit masks. By default, all violations are treated as errors.

Caution
Do not use the **error_mask** parameter if you are not sure about the consequences. Discuss these values with the Broadcom development team on a case-by-case basis. This is a mechanism to work around iSCSI implementation issues on the target side and

without proper knowledge of iSCSI protocol details, users are advised not to experiment with these parameters.

en_tcp_dack

The "Enable TCP Delayed ACK" parameter enables or disables the TCP delayed ACK feature on offloaded iSCSI connections. The TCP delayed ACK feature is ENABLED by default. To set the en_tcp_dack parameter in the bnx2i driver, enter one of the following commands:

```
insmod bnx2i.ko en_tcp_dack=0
```

or

```
modprobe bnx2i en_tcp_dack=0
```

Default: ENABLED

sq_size

Use the "Configure SQ size" parameter to select the send-queue size for offloaded connections. The SQ size determines the maximum SCSI commands that can be queued. Also, SQ size has a bearing on the number of connections that can be offloaded; as QP size increases, the number of connections supported decreases. With the default values, the AT-2973SX and AT-2973T, and AT—2973T/4 adapters can offload 28 connections.

Defaults: 128

Range: 32 to 128

Note
Broadcom validation is limited to a power of 2; for example, 32, 64, or 128.

rq_size

Use the "Configure RQ size" parameter to choose the size of asynchronous buffer queue size per offloaded connections. The RQ size is not required to be greater than 16 because it is used to place iSCSI ASYNC/NOP/REJECT messages and SCSI sense data.

Defaults: 16

Range: 16 to 32

Note
Broadcom validation is limited to a power of 2; for example, 16, 32, or 128.

event_coal_div

The Event Coalescing Divide Factor parameter is a performance tuning parameter used to moderate the rate of interrupt generation by the iscsi firmware.

Defaults: 1

Valid values: 1, 2, 4, 8

bnx2i_nopout_when_commands_active

The "iSCSI NOOP even when connection is not idle" parameter enables the offload initiator to send iSCSI NOP-OUT on wire even when the link is not truly idle. This parameter was introduced to avoid unnecessary session recoveries induced by some older targets when iSCSI NOP-OUT and iSCSI CMD pdus are intermixed. Newer iSCSI target systems are immune to this condition and this parameter is turned ON for quite some time.

Defaults: 1

Values: Binary parameter, 0/1

The parameters can also be set in the `modprobe.conf` command. See the man page for more information.

Checking the bnx2 Driver Defaults

The bnx2 driver defaults to the following settings:

Speed: Autonegotiation with all speeds advertised

Flow Control: Autonegotiation with RX and TX advertised

MTU: 1500 (range is 46–9000)

RX Ring Size: 255 (range is 0–4080)

RX Jumbo Ring Size: 0 (range 0–16320) adjusted by the driver based on MTU and RX Ring Size

TX Ring Size: 255 (range is (MAX_SKB_FRAGS+1)–255). MAX_SKB_FRAGS varies on different kernels and different architectures. On a 2.6 kernel for x86, MAX_SKB_FRAGS is 18.

Coalesce RX Microseconds: 18 (range is 0–1023)

Coalesce RX Microseconds IRQ: 18 (range is 0–1023)

Coalesce RX Frames: 6 (range is 0–255)

Coalesce RX Frames IRQ: 6 (range is 0–255)

Coalesce TX Microseconds: 80 (range is 0–1023)

Coalesce TX Microseconds IRQ: 80 (range is 0–1023)

Coalesce TX Frames: 20 (range is 0–255)

Coalesce TX Frames IRQ: 20 (range is 0–255)

Coalesce Statistics Microseconds: 999936 (approximately 1 second) (range is 0–16776960 in increments of 256)

MSI: Enabled (if supported by the 2.6 kernel and the interrupt test passes)

TSO: Enabled (on 2.6 kernels)

WoL: Initial setting based on NVRAM's setting

Checking Driver Messages

The following are the most common sample messages that may be logged in the /var/log/messages file for the bnx2 and bnx2i drivers. Use `dmesg -n <level>` command to control the level at which messages appear on the console. Most systems are set to level 6 by default. To see all messages, set the level higher. See the following sections:

- “Checking the bnx2 Driver Messages” on page 78
- “Checking bnx2i Driver Messages” on page 79

Checking the bnx2 Driver Messages

The following are the most common bnx2 driver messages:

Driver Sign on

```
Broadcom NetXtreme II Gigabit Ethernet Driver
bnx2 v1.6.3c (July 23, 2007)
```

CNIC Driver Sign on

```
Broadcom NetXtreme II cnic v1.1.19 (Sep 25, 2007)
```

NIC Detected

```
eth#: Broadcom NetXtreme II BCM5708 1000Base-T (B0)
PCI-X 64-bit 133MHz found at mem f6000000, IRQ 16, node
addr 0010180476ae

cnic: Added CNIC device: eth0
```

Link Up and Speed Indication

```
bnx2: eth# NIC Link is Up, 1000 Mbps full duplex
```

Link Down Indication

```
bnx2: eth# NIC Link is Down
```

MSI enabled successfully (bnx2 only)

```
bnx2: eth0: using MSI
```

Checking bnx2i Driver Messages

The following are the most common bnx2i driver messages:

BNX2I Driver signon

```
Broadcom NetXtreme II iSCSI Driver bnx2i v1.0.30 (Sep
29, 2007)
```

Network port to iSCSI transport name binding

```
bnx2i: netif=eth2, iscsi=bcm570x-050000
bnx2i: netif=eth1, iscsi=bcm570x-030c00
```

Driver completes handshake with iSCSI offload-enabled CNIC device

```
bnx2i [05:00.00]: ISCSI_INIT passed
```

> **Note**
> This message is displayed only when the user attempts to make an iSCSI connection.

Driver detects iSCSI offload is not enabled on the CNIC device

```
bnx2i: iSCSI not supported, dev=eth3
bnx2i: bnx2i: LOM is not enabled to offload iSCSI
connections, dev=eth0
```

Driver unable to allocate TCP port for iSCSI connection

```
bnx2i: run 'bnx2id' daemon to alloc TCP ports
```

Exceeds maximum allowed iSCSI connection offload limit

```
bnx2i: unable to allocate iSCSI context resources
```

Network route to target node and transport name binding are two different devices

```
bnx2i: conn bind, ep=0x... ($ROUTE_HBA) does not
belong to hba $USER_CHOSEN_HBA
```

where

ROUTE_HBA is the net device on which connection was offloaded based on route information
USER_CHOSEN_HBA is the HBA to which target node is bound (using iscsi transport name)

Target cannot be reached on any of the CNIC devices

```
bnx2i: check route, cannot connect using cnic
```

Network route is assigned to network interface, which is down

```
bnx2i: check route, hba not found
```

Attempting to offload iSCSI connection onto a Jumbo Frame-enabled device

```
bnx2i: eth# network i/f mtu is set to #mtu

bnx2i: iSCSI HBA can support mtu of 1500
```

> **Note**
> Change `mtu` to 1500 using `ifconfig` and restart the interface in order to offload iSCSI connections.

SCSI-ML initiated host reset (session recovery)

```
bnx2i: attempting to reset host, #3
```

CNIC detects iSCSI protocol violation - Fatal errors

```
bnx2i: iscsi_error - wrong StatSN rcvd
bnx2i: iscsi_error - hdr digest err
bnx2i: iscsi_error - data digest err
bnx2i: iscsi_error - wrong opcode rcvd
bnx2i: iscsi_error - AHS len > 0 rcvd
bnx2i: iscsi_error - invalid ITT rcvd
bnx2i: iscsi_error - wrong StatSN rcvd
bnx2i: iscsi_error - wrong DataSN rcvd
bnx2i: iscsi_error - pend R2T violation
bnx2i: iscsi_error - ERL0, UO
bnx2i: iscsi_error - ERL0, U1
```

```
bnx2i: iscsi_error - ERL0, U2
bnx2i: iscsi_error - ERL0, U3
bnx2i: iscsi_error - ERL0, U4
bnx2i: iscsi_error - ERL0, U5
bnx2i: iscsi_error - ERL0, U
bnx2i: iscsi_error - invalid resi len
bnx2i: iscsi_error - MRDSL violation
bnx2i: iscsi_error - F-bit not set
bnx2i: iscsi_error - invalid TTT
bnx2i: iscsi_error - invalid DataSN
bnx2i: iscsi_error - burst len violation
bnx2i: iscsi_error - buf offset violation
bnx2i: iscsi_error - invalid LUN field
bnx2i: iscsi_error - invalid R2TSN field
bnx2i: iscsi_error - invalid cmd len1
bnx2i: iscsi_error - invalid cmd len2
bnx2i: iscsi_error - pend r2t exceeds
MaxOutstandingR2T value
bnx2i: iscsi_error - TTT is rsvd
bnx2i: iscsi_error - MBL violation
bnx2i: iscsi_error - data seg len != 0
bnx2i: iscsi_error - reject pdu len error
bnx2i: iscsi_error - async pdu len error
bnx2i: iscsi_error - nopin pdu len error
bnx2i: iscsi_error - pend r2t in cleanup
bnx2i: iscsi_error - IP fragments rcvd
bnx2i: iscsi_error - IP options error
bnx2i: iscsi_error - urgent flag error
```

CNIC detects iSCSI protocol violation - non-FATAL, warning

```
bnx2i: iscsi_warning - invalid TTT
bnx2i: iscsi_warning - invalid DataSN
bnx2i: iscsi_warning - invalid LUN field
```

Note
The driver needs to be configured to consider certain violations as a warning and not as a critical error.

Driver puts a session through recovery

```
conn_err - hostno 3 conn 03fbcd00, iscsi_cid 2 cid
a1800
```

Reject iSCSI PDU received from the target

```
bnx2i - printing rejected PDU contents

[0]: 1 ffffffa1 0 0 0 0 20 0
[8]: 0 7 0 0 0 0 0 0
[10]: 0 0 40 24 0 0 ffffff80 0
[18]: 0 0 3 ffffff88 0 0 3 4b
[20]: 2a 0 0 2 ffffffc8 14 0 0
[28]: 40 0 0 0 0 0 0 0
```

Open-iSCSI daemon handing over session to driver

```
bnx2i: conn update - MBL 0x800 FBL 0x800MRDSL_I 0x800
MRDSL_T 0x2000
```

Teaming with Channel Bonding

With the Linux drivers, you can team adapters together using the bonding kernel module and a channel bonding interface. For more information, see the Channel Bonding information in your operating system documentation.

Statistics

You can view detailed statistics and configuration information using the ethtool utility. See the `ethtool` man page for more information.

Linux iSCSI Offload

This section describes how to install and run Linux iSCSI applications. The following recommendations apply to offloading Linux iSCSI programs:

- Not all Broadcom NetXtreme II adapters support iSCSI offload.
- The iSCSI session will not recover after a hot remove and hot plug.
- The iSCSI driver/firmware will not offload iSCSI connections onto a jumbo frame-enabled CNIC device.
- For MPIO to work properly, iSCSI nopout should be enabled on each iSCSI session. Refer to open-iscsi documentation for procedures on setting up noop_out_interval and noop_out_timeout values.
- In the scenario where multiple CNIC devices are in the system and the system is booted via Broadcom's iSCSI boot solution, ensure that the iscsi node under /etc/iscsi/nodes for the boot target is bound to the NIC that is used for booting.

See the following sections:

- “Installing User Application - bnx2id” on page 83
- “Installing Open iSCSI User Applications” on page 83
- “Binding iSCSI Target to Broadcom NX2 iSCSI Transport Name” on page 84
- “Making Connections to iSCSI Targets” on page 85
- “Maximizing Offload iSCSI Connections” on page 85

Installing User Application - bnx2id

When the bnx2i RPM package is installed, install the **bnx2id** application under /sbin. See "Installing the Source RPM Package" on page 68 for information. Run the **bnx2id** daemon before attempting to create iSCSI connections. The driver does not establish connections to the iSCSI target without the daemon's assistance.

```
bnx2id
```

The bnx2id daemon requires mknod and sh shell, which are standard on any regular server. For iSCSI boot using NetXtreme II offload support, binaries for mknod and sh need to be bundled into an initrd image.

Installing Open iSCSI User Applications

Install and run the open-iscsi programs, **iscsid** and **iscsiadm**, from the Broadcom distributed open-iscsi packages. See "Packaging" on page 67 for details. Before you can install the Broadcom iSCSI-supported packages, remove all pre-installed open-iscsi packages.

To install and run the **iscsid** and **iscsiadm** programs, do the following:

1. Remove all existing open-iscsi packages.

   RHEL5

   ```
   rpm -e iscsi-initiator-utils
   ```

   SLES10 SP1

   ```
   rpm -e open-iscsi
   ```

2. Install the source RPM package by entering:

   ```
   rpm -ivh <open-iscsi-package-name>.src.rpm
   ```

3. CD to the RPM path and build the binary driver for your kernel. Enter:

   ```
   cd /usr/src/{redhat,OpenLinux,turbo,packages,rpm
   ..}

   rpm -bb SPECS/<open-iscsi-package-name>.spec
   ```

   or

   ```
   rpmbuild -bb SPECS/<open-iscsi-package-name>.spec
   (for RPM version 4.x.x)
   ```

   Note
   The RPM path is different for each Linux distribution.

4. Install the newly built package by entering:

   ```
   rpm -ivh RPMS/<arch>/<open-iscsi-package-
   name>.<arch>.rpm
   ```

   where <arch> is the machine architecture such as i386.

   ```
   rpm -ivh RPMS/i386/<open-iscsi-package-
   name>.i386.rpm
   ```

5. Start the daemon by entering:

   ```
   iscsid
   ```

Binding iSCSI Target to Broadcom NX2 iSCSI Transport Name

By default, the open-iscsi daemon connects to discovered targets using software initiator (transport name = 'tcp'). If you want to offload an iSCSI connection onto CNIC device should explicitly change the transport binding of the iSCSI node. This can be done using **iscsiadm** cli utility as follows:

```
iscsiadm --mode node --targetname iqn.2004-
06.com.broadcom:tg1 \

                --portal 192.168.1.100 --op=update \

                --name=node.transport_name --
                value=${XPORT_NAME}
```

where XPORT_NAME=bcm570x-xxyyzz

```
xx - pci bus number of the NX2 device
yy - pci device number of the NX2 device
zz - pci function number of the NX2 device
```

Network interface to iscsi transport name binding can be obtained by executing:

```
dmesg | grep "bnx2i: netif"
```

Sample output in a system with two NetXtreme II devices:

```
bnx2i: netif=eth1, iscsi=bcm570x-050000
bnx2i: netif=eth0, iscsi=bcm570x-030000
```

If you want to switch back to using the software initiator, enter the following:

```
iscsiadm --mode node --targetname iqn.2004-
06.com.broadcom:tg1 \

                --portal 192.168.1.100 --op=update \

                --name=node.transport_name --value=tcp
```

Making Connections to iSCSI Targets

Refer to open-iscsi documentation for a comprehensive list of **iscsiadm** commands. The following is a sample list of commands to discovery targets and to create iscsi connections to a target:

Adding static entry

```
iscsiadm -m node -p <ipaddr[:port]> -T iqn.2007-
05.com.broadcom:target1 -o new
```

iSCSI target discovery using 'SendTargets'

```
iscsiadm -m discovery --type sendtargets -p
<ipaddr[:port]>
```

Login to target using 'iscsiadm' command

```
iscsiadm --mode node --targetname <iqn.targetname> --
portal <ipaddr[:port]> --login
```

List all drives active in the system

```
'fdisk -l'
```

Maximizing Offload iSCSI Connections

With default driver parameters set, which includes 128 outstanding commands, bnx2i can offload a maximum of 28 iSCSI connections. This is not a hard limit, but simple on-chip resource allocation math. The bnx2i driver can offload > 28 connections by reducing the shared queue size which, in turn, limits the maximum outstanding tasks on a connection. See “Setting Values for Optional Properties” on page 74 for information on sq_size and rq_size. The driver logs the following message to syslog when the maximum allowed connection offload limit is reached - "bnx2i: unable to allocate iSCSI context resources."

Chapter 7

Installing the Windows Drivers

This chapter provides procedures to install and remove the driver software for all of the Windows Operating Systems supported by the AT-2973SX, AT-2973T, and AT-2973T/4 adapters. In addition, it describes how to display and change adapter properties including power management options. This chapter discusses the following topics:

- “Installing the Windows Driver Software” on page 88
- “Removing the Device Drivers” on page 97

Installing the Windows Driver Software

This chapter describes how to install all of the following Windows Operating Systems:

- Microsoft Windows Server 2003 (32-bit and 64-bit extended)
- Microsoft Windows Server 2008 (32-bit and 64-bit extended)
- Microsoft Windows Server 2008 R2 (32-bit and 64-bit extended)
- Microsoft Windows Vista™ (32-bit and 64-bit extended)
- Microsoft Windows 7™ (32-bit and 64-bit extended)

The Windows driver software for all of the Windows Operating Systems is available on the Allied Telesis website at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to display the current list of software drivers.

When Windows starts after the AT-2973SX, AT-2973T, or AT-2973T/4 adapter has been installed, the operating system automatically detects the hardware and prompts you to install the driver software for that device. You also receive this same prompt when you remove an existing device driver.

There are two methods used to install the software drivers on all of the Windows Operating Systems supported by the AT-2973SX, AT-2973T, and AT-2973T/4 adapters: the Installer and Silent installation. The Installer uses a graphical interactive mode. The Silent Installation is a command-line interface for unattended installation. See the following sections:

- “Using the Installer” on page 89
- “Using Silent Installation” on page 94

Note
These instructions are based on the assumption that your adapter was not factory installed. If your controller was installed at the factory, the driver software has been installed for you.

Note
Before installing the driver software, verify that the Windows operating system has been upgraded to the latest version with the latest service pack applied.

Note
You must physically install a network device driver before the Broadcom NetXtreme II Controller can be used with your Windows Operating System. There is no installation CD. You must download the drivers from the Allied Telesis website at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of documents and drivers.

Note
To use the TCP/IP Offload Engine (TOE), you must have Windows Server 2003 with Service Pack 2 (SP2) and a license key preprogrammed in the hardware. If supported, for iSCSI you only need a license key.

Using the Installer

The Installer has a graphical interactive installation mode. To install the AT-2973SX, AT-2973T, and AT-2973T/4 drivers on a Windows Operating System, do the following:

1. When the **Found New Hardware Wizard** appears, click **No, not this time**.

   See Figure 13 on page 90 for the Found New Hardware Wizard Page.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

Figure 13. Found New Hardware Wizard Page

2. From the driver directory, select the setup.exe file and **Run**.

The Broadcom NetXtreme II Driver Installer - InstallShield Wizard Page is displayed. See Figure 14.

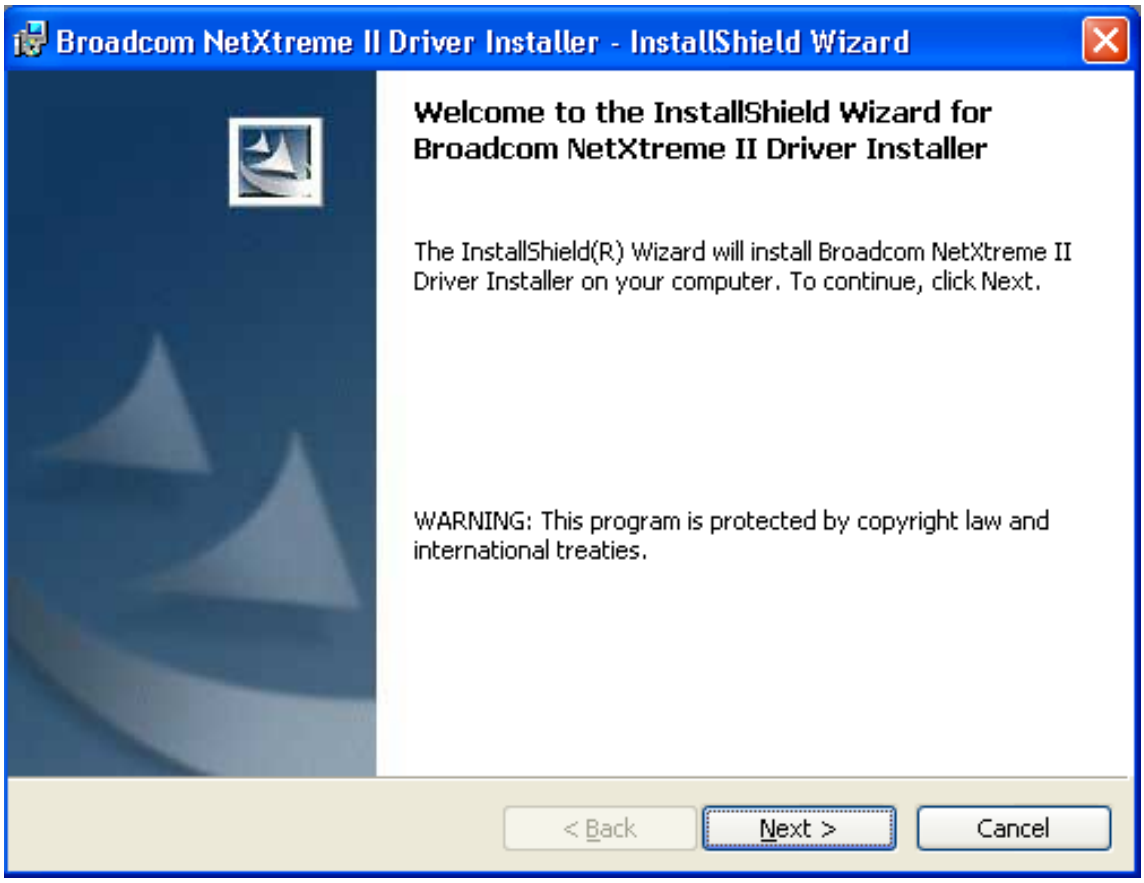
Broadcom NetXtreme II Driver Installer - InstallShield Wizard
Welcome to the InstallShield Wizard for Broadcom NetXtreme II Driver Installer
The InstallShield(R) Wizard will install Broadcom NetXtreme II Driver Installer on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
< Back
Next >
Cancel

Figure 14. Broadcom NetXtreme II Driver Installer - InstallShield Wizard Page

3. Click **Next** to continue.

   The License Agreement Page is displayed. See Figure 15 on page 92.

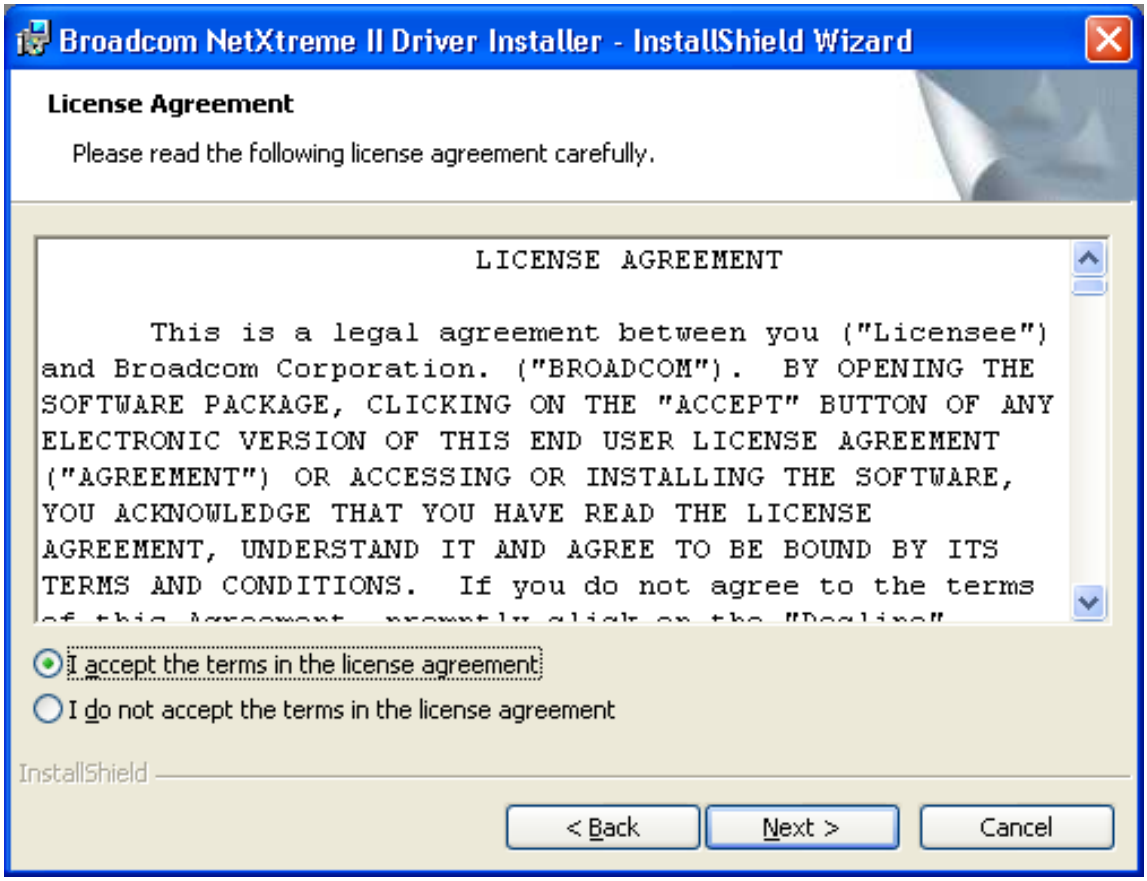
Broadcom NetXtreme II Driver Installer - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
LICENSE AGREEMENT
This is a legal agreement between you ("Licensee") and Broadcom Corporation. ("BROADCOM"). BY OPENING THE SOFTWARE PACKAGE, CLICKING ON THE "ACCEPT" BUTTON OF ANY ELECTRONIC VERSION OF THIS END USER LICENSE AGREEMENT ("AGREEMENT") OR ACCESSING OR INSTALLING THE SOFTWARE, YOU ACKNOWLEDGE THAT YOU HAVE READ THE LICENSE AGREEMENT, UNDERSTAND IT AND AGREE TO BE BOUND BY ITS TERMS AND CONDITIONS. If you do not agree to the terms
I accept the terms in the license agreement
I do not accept the terms in the license agreement
InstallShield
< Back
Next >
Cancel

Figure 15. License Agreement Page

4. After you review the license agreement, click **I accept the terms in the license agreement** and then click **Next** to continue.

   The Ready to Install the Program Page is displayed. See Figure 16 on page 93.

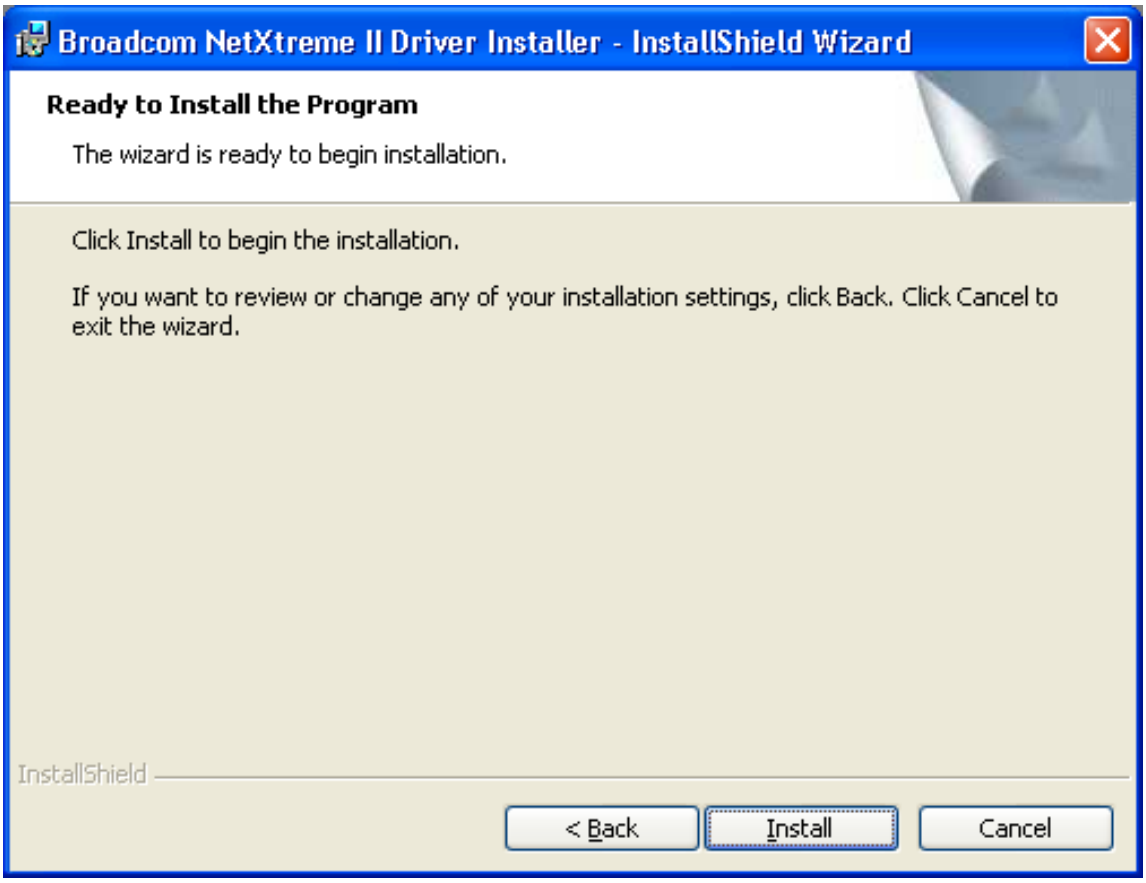
Broadcom NetXtreme II Driver Installer - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Figure 16. Ready to Install the Program Page

5. Click **Install**.

   The InstallShield Wizard Completed Page is displayed. See Figure 17 on page 94.

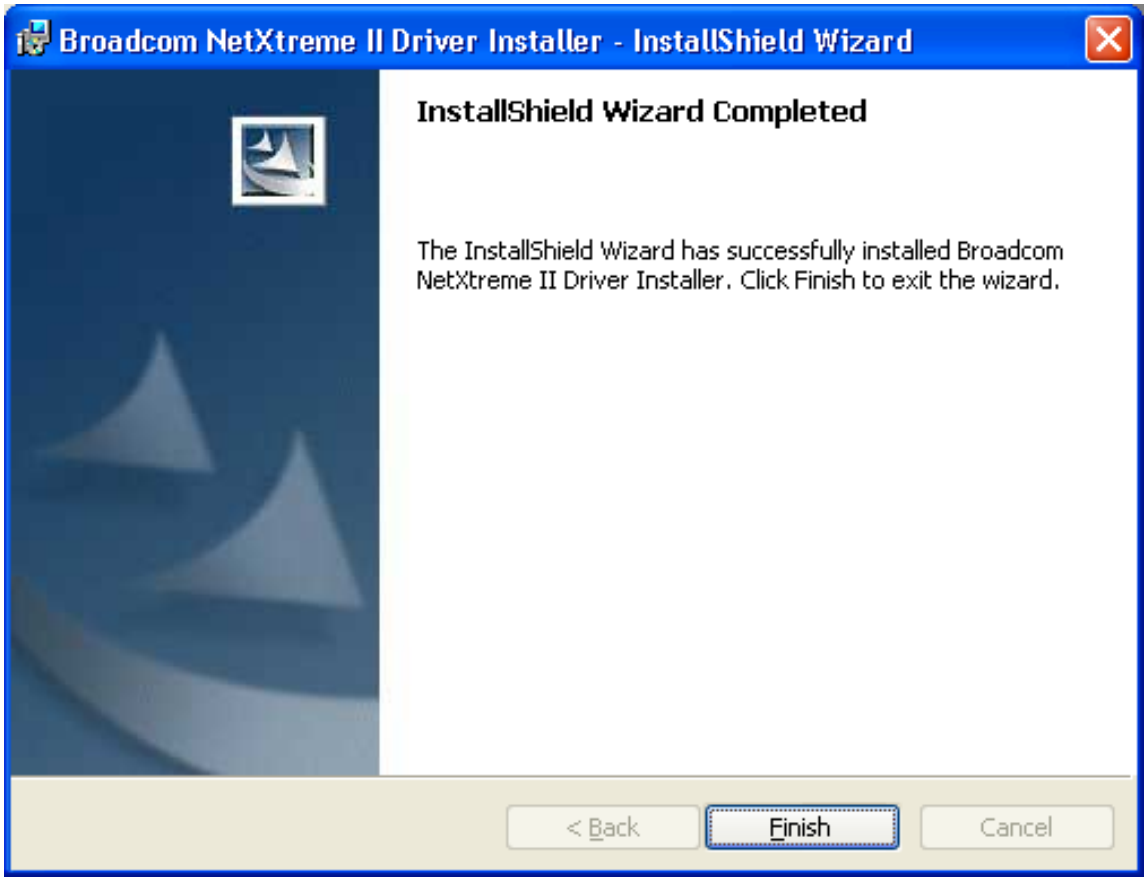
Broadcom NetXtreme II Driver Installer - InstallShield Wizard
InstallShield Wizard Completed
The InstallShield Wizard has successfully installed Broadcom NetXtreme II Driver Installer. Click Finish to exit the wizard.
< Back
Finish
Cancel

Figure 17. InstallShield Wizard Completed Page

6. Click **Finish** to close the wizard.
7. The installer determines if a system restart is necessary. Follow the on-screen instructions.

Using Silent Installation

Silent installation provides a command-line silent mode which allows for unattended installation. This section discusses the various ways to perform a silent installation on all of the Windows Operating Systems supported by the AT-2973SX, AT-2973T, and AT-2973T/4 adapters. See the following:

- ❒ “Performing a Silent Install” on page 95
- ❒ “Performing a Silent Install and Creating a Log File” on page 95
- ❒ “Performing a Silent Upgrade” on page 95
- ❒ “Performing a Silent Uninstall” on page 95
- ❒ “Performing a Silent Reinstall” on page 96

Note
All commands are case sensitive.

Note
User must "Run as Administrator" for Vista when using "msiexec" for "silent" install or uninstall procedures.

Note
For detailed instructions and information about unattended installs, refer to the Silent.txt file in the DrvInst folder.

Performing a Silent Install

To perform a silent install from within the installer source folder, enter one of the following:

```
setup /s /v/qn
```

or

```
msiexec /i "BDrv5706.msi" /qn
```

Performing a Silent Install and Creating a Log File

To perform a silent install and create a log file at (f:\1testlog.txt), enter:

```
setup /s /v"/qn /L f:\1testlog.txt"
```

Performing a Silent Upgrade

To perform a silent upgrade from within the installer source folder, enter:

```
setup /s /v/qn
```

Performing a Silent Uninstall

There are two ways to perform a silent uninstall— from the installer source folder and from the any folder.

In some circumstances, you must reboot your system before uninstallation can continue. If you used REBOOT=ReallySuppress to suppress the reboot, the uninstallation may be suspended. In this case, you need to reboot manually for the uninstallation to continue.

To perform a silent uninstall from within the installer source folder, enter:

```
msiexec /x "BDrv5706.msi" /qn
```

To perform a silent uninstall from any folder, enter:

```
msiexec /x "{F0DA8A3F-1457-419E-96F4-235DD3EF41E1}" /
qn
```

Note
The hexidecimal number above may differ from your current installer. Check the Key name corresponding with the Broadcom Advanced Control Suite 3 (BACS) application in HKLM\Software\Mictrosoft\Windows\CurrentVersion\Uninstall for the correct hexidecimal number.

Performing a Silent Reinstall

To perform a silent reinstall of the same installer, enter:

```
setup /s /v"/qn REINSTALL=ALL"
```

Note
Use REINSTALL switch only if the same installer is already installed on the system. If you are upgrading an earlier version of the installer, use setup /s /v/qn as described above.

Removing the Device Drivers

This section discusses how to remove the device drivers.

> **Note**
> Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 provide the Device Driver Rollback feature to replace a device driver with one that was previously installed. However, the complex software architecture of the NetXtreme II device may present problems if the rollback feature is used on one of the individual components. Therefore, Allied Telesis recommends that changes to driver versions be made only through the use of a driver installer.

To remove the device drivers, do the following:

1. In Control Panel, double-click **Add or Remove Programs**.
2. Click **Broadcom NetXtreme II GigE Driver Installer**, and then click **Remove**. Follow the on screen prompts.
3. Click **Yes** to restart your system.

   - or -

4. Click **No** to restart your system at a later time.
5. Click **OK** to acknowledge that the installation has been suspended.

   The uninstallation of the driver is postponed until the next restart of your system.

Chapter 8

Setting Advanced Properties

For all of the Windows operating systems, you access the Windows Advanced Properties from the Advanced Tab. Although the default values of the Advanced Properties are appropriate in most cases, you can change any of the available options to meet the requirements of your system.

This chapter discusses the following topics:

- ❒ “Accessing the Advanced Tab” on page 100
- ❒ “Modifying Advanced Properties” on page 107

Accessing the Advanced Tab

To modify the configuration properties of the Windows Operating systems, you must access the Advanced Tab. Depending on your operating system, there are several ways to do this. See the following procedures:

- “Selecting the Advanced Tab in Windows Server 2003” on page 100
- “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103
- “Selecting the Advanced Tab in Windows Vista” on page 104

Selecting the Advanced Tab in Windows Server 2003

After you have installed the adapter driver software, you can use this procedure to access the System Property Dialog box which provides access to the Advanced Properties on the Advanced Tab.

To access the System Properties Dialog box, do the following:

1. Start a Windows Server 2003 system and log in.

   You must have Administrator privileges to update the driver software.

2. On the desktop, right click **My Computer**.

   The My Computer window opens.

3. Select **Properties** from the menu.

   The System Properties Dialog box opens, as shown in Figure 18 on page 101.

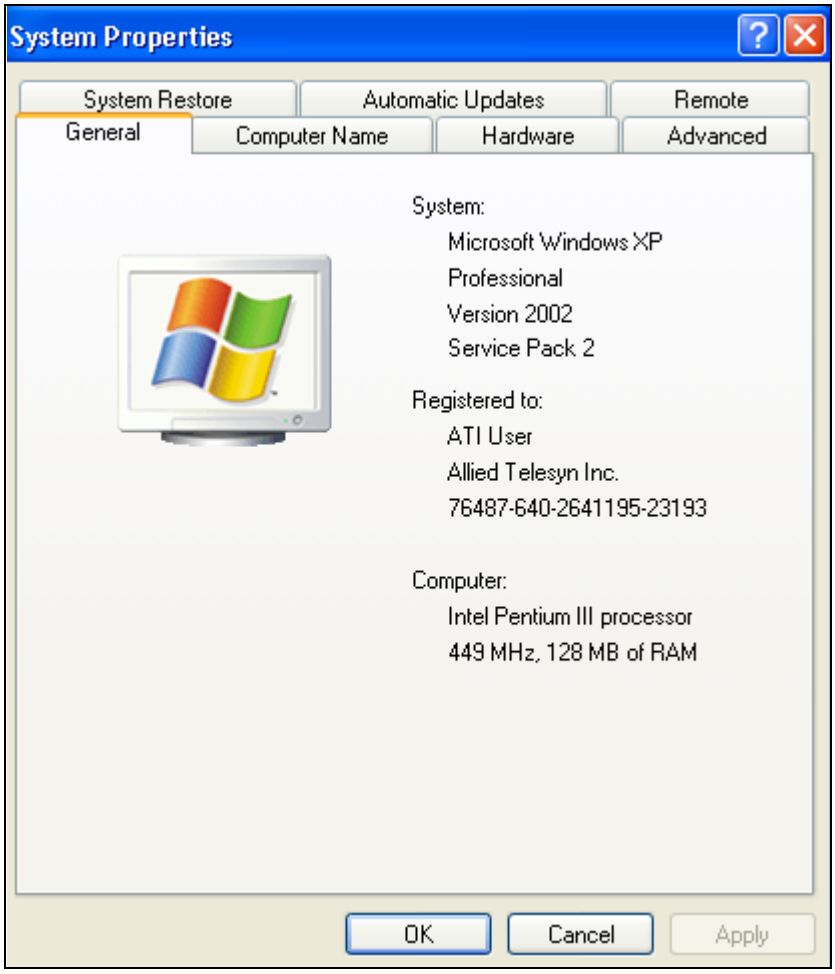

Figure 18. System Properties Dialog Box

4. Click on the **Advanced** tab on the System Properties Dialog Box which is located at the top of the window.

The Advanced tab is shown in Figure 19.

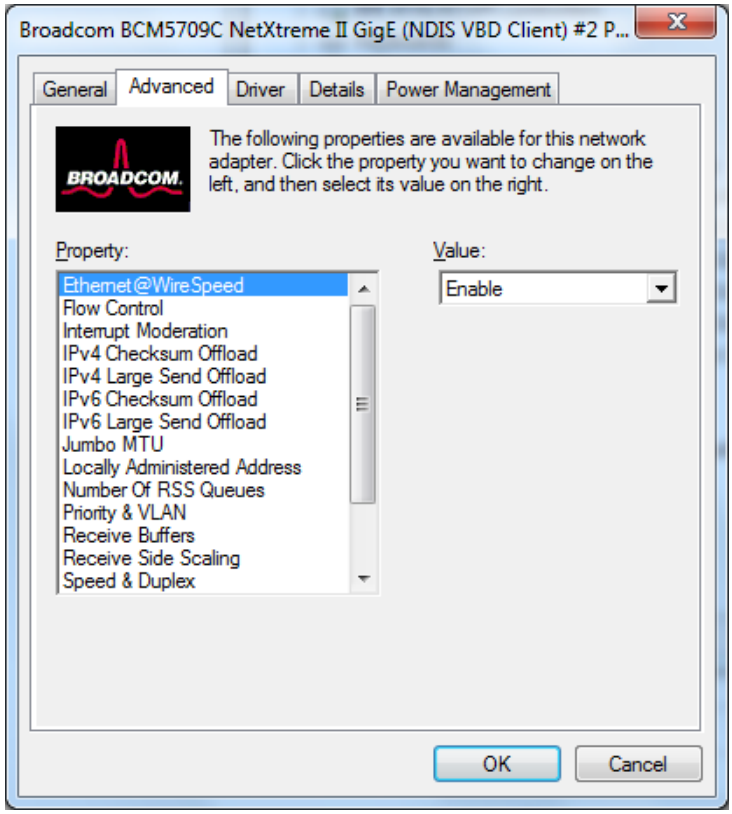

Figure 19. Advanced Tab

Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7

To select the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, or Windows 7 Operating systems, do the following:

1. Select the Start button. See Figure 20.

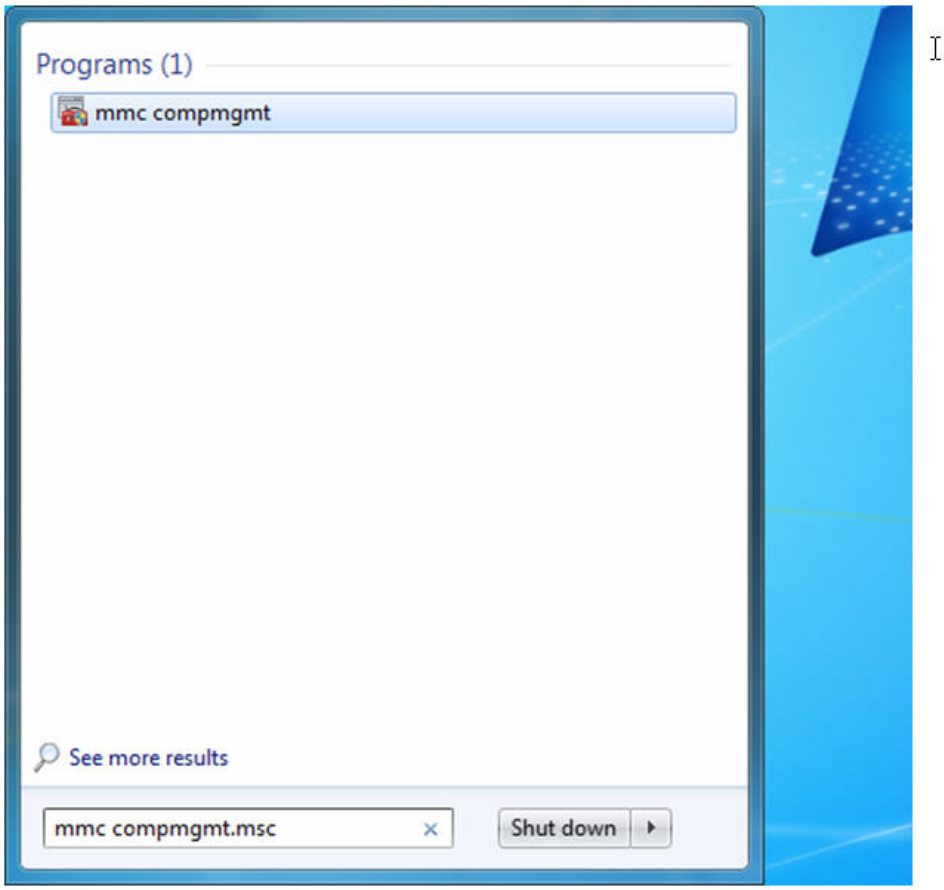

Figure 20. Windows Server 2008, Windows Server 2008 R2, and Windows 7 Search Box

2. Enter the following command:

   ```
   mmc compmgmt.msc
   ```

   The Device Manager window is displayed. See Figure 21 on page 104.

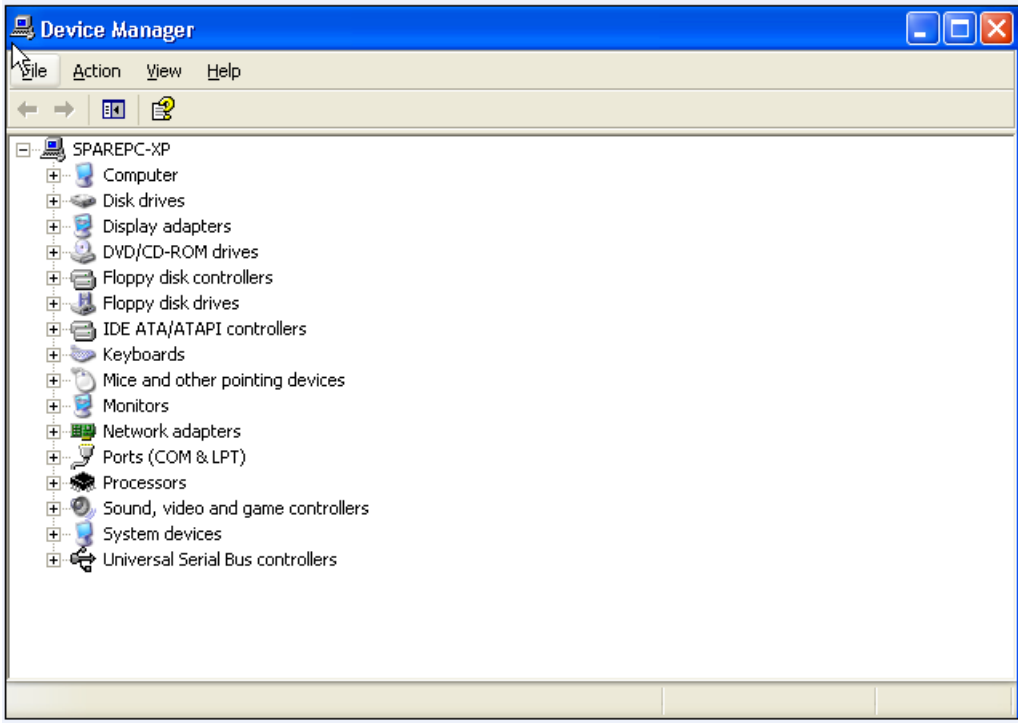

Figure 21. Device Manager Window

3. Open the Network Adapters folder.

   The list of installed adapters is displayed.

4. Right click on one of the following adapters:

   - **Allied Telesis AT-2973SX**
   - **Allied Telesis AT-2973T**
   - **Allied Telesis AT-2973T/4**

   The adapter window is displayed.

5. Select the **Advanced** tab.

   The Advanced tab is shown in Figure 19 on page 102.

Selecting the Advanced Tab in Windows Vista

In the Windows Vista Operating System, you access the Advanced Tab through the Device Manager.

To select the Device Manager in the Windows Vista Operating System, do the following:

1. Select the Start menu.

See Figure 22 for an example of the Windows Vista Start menu.

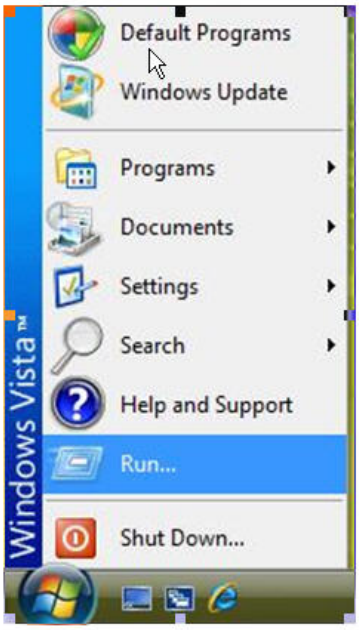

Figure 22. Windows Vista Start Menu

2. From the Start Menu, select **Run**.

   The Windows Vista Run window is displayed. See Figure 23.

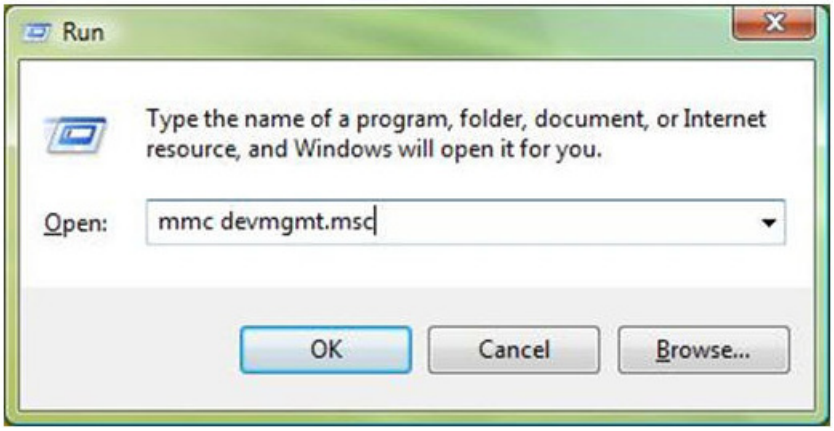

Figure 23. Windows Vista Run Window

3. Enter the following command in the Run window:

   `mmc devmgmt.msc`

4. From the Computer Management Window, select Device Manager in the left panel.

   The Device Manager window is displayed. See Figure 21 on page 104.

5. Open the Network Adapters folder.

   The list of installed adapters is displayed.

6. Right click on one of the following adapters:

   - **Allied Telesis AT-2973SX**
   - **Allied Telesis AT-2973T**
   - **Allied Telesis AT-2973T/4**

   The adapter window is displayed.

7. Select the **Advanced** tab.

   The Advanced tab is shown in Figure 19 on page 102.

Modifying Advanced Properties

After you have installed the driver software, you can use the following procedures to verify or change the adapter properties:

- ❒ "Updating the Ethernet@ WireSpeed Property" on page 108
- ❒ "Updating the Flow Control Property" on page 108
- ❒ "Updating the Interrupt Moderation Property" on page 110
- ❒ "Updating the Checksum Offload Property" on page 111
- ❒ "Updating the Large Send Offload Property" on page 112
- ❒ "Updating the Jumbo MTU Property" on page 113
- ❒ "Updating the Network Address Property" on page 114
- ❒ "Updating the RSS Queues Property" on page 115
- ❒ "Updating the Priority & VLAN Property" on page 116
- ❒ "Updating the Receive Buffers Property" on page 117
- ❒ "Updating the Receive Side Scaling Property" on page 117
- ❒ "Updating the Speed & Duplex Mode Property" on page 118
- ❒ "Updating the TCP Connection Offload Properties" on page 120
- ❒ "Updating the Transmit Buffers Property" on page 121
- ❒ "Updating the VLAN ID Property" on page 121

Note
After you upgrade the driver software, the Advanced Properties may change.

Note
The procedures in the sections listed above may differ slightly if the "Classic Start Menu" is set on your computer.

Updating the Ethernet@ WireSpeed Property

The Ethernet@Wirespeed property enables a Gigabit Ethernet adapter to establish a link at a lower speed when only two pairs of wires are available in the cabling plant. By default, the Ethernet@Wirespeed property is enabled.

To enable or disable the Ethernet@WireSpeed property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
   - For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Ethernet@Wirespeed**.

3. From the Value list on the Advanced tab, select one of the following:

   - **Enable** - Enables Ethernet@Wirespeed. This is the default.
   - **Disable** - Disables Ethernet@Wirespeed.

4. Click **OK**.

5. If you are prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, Allied Telesis recommends rebooting recommended to reinitialize all of the registers.

6. Verify that the adapter port LEDs are operating correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the Flow Control Property

The Flow Control property allows you to enable or disable the receipt or transmission of PAUSE frames which, in turn, allows the adapter and the switch to control the transmit rate. The port side that receives the PAUSE frame momentarily stops transmitting. The recommended selection is Disable, which configures the adapter to ignore PAUSE frames. By default, the Flow Control property is disabled.

To change the Flow Control property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
   - For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Flow Control**.

3. From the Value list on the Advanced tab, select one of the following:

   - **Auto -** (default) PAUSE frame receipt and transmission is optimized.
   - **Disable -** PAUSE frame receipt and transmission is disabled (recommended).
   - **Rx PAUSE -** PAUSE frame receipt is enabled.
   - **Rx/Tx PAUSE -** PAUSE frame receipt and transmission is enabled.
   - **Tx PAUSE -** PAUSE frame transmission is enabled.

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all of the registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the Interrupt Moderation Property

Interrupt moderation enables adaptive interrupt coalescing, which limits the rate of interrupt to the CPU during packet transmission and packet reception. The disabled option allows one interrupt for every packet transmission and packet reception. The default value is Enabled.

To change the Interrupt Moderation setting, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
   - For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Interrupt Moderation**.

   For an example of the Advanced tab, see Figure 19 on page 102.

3. From the Value list on the Advanced tab, select one of the following:

   - **Enabled**
   - **Disabled**

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, Allied Telesis recommends rebooting to reinitialize all of the registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the Checksum Offload Property

Usually, the Checksum Offload function is computed by the protocol stack. By selecting one of the Checksum Offload properties, the adapter can compute the checksum.

To change the Checksum Offload setting, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
   - For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list under the Advanced tab, select **IPv4 Checksum Offload** or **IPv6 Checksum Offload**.

3. From the Value list on the Advanced tab, select one of the following:

   - **None** - Disables checksum offloading.
   - **Rx TCP/IP Checksum** - Enables receive TCP, IP, and UDP checksum offloading.
   - **Tx TCP/IP Checksum** - Enables transmit TCP, IP, and UDP checksum offloading.
   - **Tx/Rx TCP/IP Checksum** (default) - Enables transmit and receive TCP, IP, and UDP checksum offloading.

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the Large Send Offload Property

Normally, the protocol stack performs TCP segmentation. When you enable the Large Send Offload property, the network adapter does the TCP segmentation. There are several Large Send Offload properties to choose from, depending on the TCP/IP version you are using on your PC. You can select IPV4, IPV4 version 2, or IPv6 version 2. By default, the Large Send Offload Property is disabled.

To change the Large Send Offload property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
   - For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select one of the following:

   - **IPv4 Large Send Offload**
   - **IPv6 Large Send Offload**

3. From the Value list on the Advanced tab, select one of the following:

   - **Enable** - Enables the Large Send Offload property.
   - **Disable** - Disables the Large Send Offload property. This is the default.

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the Jumbo MTU Property

The Jumbo MTU property allows the adapter to transmit and receive oversized Ethernet frames that are greater than 1,514 bytes but less than 9,000 bytes in length. Note that this property requires a switch that is able to process large frames. By default, the Jumbo MTU property is set to 1500 bytes.

To increase the size of the received frames, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
   - For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Jumbo MTU**.
3. From the Value list on the Advanced tab, select the byte quantity in 500-byte increments.
4. Click **OK**.
5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the adapter port LEDs are operating correctly. See one of the following descriptions:

   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the Network Address Property

The Network Address is a user-defined address that is used to replace the MAC address that was originally assigned to the adapter. In some operating systems, this property is called Locally Administered Address. The network address consists of a 12-digit hexadecimal number.

To change the Network Address property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
   - For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Network Address**.

3. In the Value list on the Advanced tab, enter the Locally Administered Address. Here are some guidelines:

   - The range is 0000 0000 0001 to FFFF FFFF FFFD.
   - Do not use a multicast address (least significant bit of the high byte = 1).
   - Do not use all 0's or all F's.

4. If you are prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

5. Verify that the port LEDs are operating correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the RSS Queues Property

The number of RSS queues varies depending on the adapter. For 1 Gbps network adapters, the RSS queue options are 1, 2, 4, and 8. The default is 8 RSS queues. For 10 Gbps network adapters, the RSS queue options are Auto, 1, 2, 4, 8, and 16. The default value is Auto queues.

To set the number of RSS Queues property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
   - For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Number of RSS Queues**.

3. From the Value list on the Advanced tab, select one of the following:

   - **1, 2, 4, or 8** (for 1 Gbps adapters)
   - **Auto, 1, 2, 4, 8, or 16** (for 10 Gbps adapters)

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the Priority & VLAN Property

Priority allows you to prioritize traffic or limit bandwidth instead of treating all traffic in the same manner. A Virtual Local Area Network (VLAN) is a logical area network that extends beyond a traditional LAN to a group of logical LANs. By default, this property is enabled.

To set the port priority and assign a VLAN ID, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
   - For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **“Priority & VLAN**.”

3. From the Value list on the Advanced tab, select one of the following:

   - **Priority & VLAN Disabled**
   - **Priority & VLAN Enabled**
   - **Priority Enabled**
   - **VLAN Enabled**

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LEDs are operating correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the Receive Buffers Property

Receive Buffers are data segments that allow the network adapter to allocate receive packets to memory. For 1 Gbps adapters, the range of valid receive buffers is 50 to 2,000 in increments of 1. The default value is 750 receive buffers.

To set the Receive Buffers property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
   - For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Receive Buffers**.
3. From the Value list on the Advanced tab, enter a value between 50 and 2,000.
4. Click **OK**.
5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the Receive Side Scaling Property

The Receive Side Scaling (RSS) feature configures RSS queues from 1 to 4. The available options are RSS 1 Queue, RSS 2 Queue, and RSS 4 Queue. By default, RSS is enabled.

To set RSS, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.

- For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
- For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Receive Side Scaling**.
3. From the Value list on the Advanced tab, select one of the following:
   - **Enabled**
   - **Disabled**
4. Click **OK**.
5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.
6. Verify that the port LED operates correctly. See one of the following descriptions:
   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the Speed & Duplex Mode Property

The Speed & Duplex Mode property allows you to set the speed of the copper adapters as well as the change the duplex mode from full to half. By default, the duplex mode is set to a speed of 1000 Mb in full duplex mode.

Note
You cannot change the speed or duplex mode of the AT-2973SX adapter. It is set to a speed of 1000Mbps in full-duplex mode.

To change the speed and duplex mode of a copper-based adapter, do the following:

1. Access the **Advanced** tab:
   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.

- For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
- For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Speed & Duplex**.
3. From the Value list on the Advanced tab, select one of the following:
   - **10 Mb Full**
   - **10 Mb Half**
   - **100 Mb Full**
   - **100 Mb Half**
   - **Auto**

   The Auto setting is a speed of 1000 Mb in full duplex mode. This is the default setting for the adapters.
4. Click **OK**.
5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.
6. Verify that the port LEDs are operating correctly. See one of the following descriptions:
   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the TCP Connection Offload Properties

There are two types of TCP Connection Offload properties. The TCP Connection Offload (IPv4) property enables or disables TOE offload when the IPv4 protocol is in use. The TCP Connection Offload (IPv6) property enables or disables TOE offload when the IPv6 protocol is in use. By default, this property is enabled for both the IPv4 and IPv6 versions.

To set TCP Connection Offload for both the IPv4 and IPv6 properties, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see “Selecting the Advanced Tab in Windows Server 2003” on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
   - For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **TCP Connection Offload (IPv4)** or **TCP Connection Offload (IPv6)**.

3. From the Value list on the Advanced tab, select one of the following:

   - **Enabled**
   - **Disabled**

4. Click **OK**.

5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Updating the Transmit Buffers Property

Transmit buffers are data segments that allow the network adapter to monitor transmit packets in the system memory. The default value is 1500.

To set the Transmit Buffers property, do the following:

1. Access the **Advanced** tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.
   - For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see "Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7" on page 103.
   - For Windows Operating systems, see "Selecting the Advanced Tab in Windows Vista" on page 104.

   The Advanced tab is shown in Figure 19 on page 102.

2. From the Property list on the Advanced tab, select **Transmit Buffers**.
3. From the Value list on the Advanced tab, enter a number between 0 and 2,500.
4. Click **OK**.
5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LED operates correctly. See one of the following descriptions:

   - "AT-2973SX Adapter Physical Description" on page 17
   - "AT-2973T Adapter Physical Description" on page 18
   - "AT-2973T/4 Adapter Physical Description" on page 21

Updating the VLAN ID Property

The VLAN ID specifies the VLAN identifier. It is the number of the VLAN where the port is an untagged member. You must assign a VLAN ID to a VLAN. The range is 1 to 4094. The default VLAN has a VLAN ID of 0.

To assign a VLAN ID, do the following:

1. Access the Advanced Tab:

   - For Windows Server 2003 Operating systems, see "Selecting the Advanced Tab in Windows Server 2003" on page 100.

- For Windows Server 2008, Windows Server 2008 R2 or Windows 7 Operating systems, see “Selecting the Advanced Tab in Windows Server 2008, Windows Server 2008 R2, and Windows 7” on page 103.
- For Windows Operating systems, see “Selecting the Advanced Tab in Windows Vista” on page 104.

The Advanced tab is shown in Figure 19 on page 102.

2. Under Property list on the Advanced tab, select **VLAN ID**.
3. From the Value list on the Advanced tab, choose a VLAN ID from 1 to 4094.

Note
The default VLAN has a VLAN ID of 0.

4. Click **OK**.
5. If prompted to restart your computer, click **Yes**.

   Although it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.

6. Verify that the port LEDs are operating correctly. See one of the following descriptions:

   - “AT-2973SX Adapter Physical Description” on page 17
   - “AT-2973T Adapter Physical Description” on page 18
   - “AT-2973T/4 Adapter Physical Description” on page 21

Chapter 9

Installing CIM and SNMP for Manageability

Both Common Information Model (CIM) and Simple Network Management Protocol (SNMP) are information models that allow you to monitor and manage a PC or a network. Both CIM and SNMP are supported on the Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 Operating Systems. The CIM standard defines managed elements and the SNMP standard defines events such as temperature threshold and power outages which are called traps.

This chapter discusses the following topics:

- “Installing CIM” on page 124
- “Installing SNMP” on page 127

Installing CIM

The Common Information Model (CIM) is an industry standard defined by the Distributed Management Task Force (DMTF). Microsoft implements CIM on Windows platforms. Also, Broadcom supports CIM on the Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 platforms.

Broadcom's implementation of CIM enables various classes to provide information through CIM client applications. The Broadcom CIM data provider provides data only. In addition, you can select your preferred CIM client software to browse the information exposed by the Broadcom CIM provider.

The Broadcom CIM provider provides information through the following classes:

- BRCM_NetworkAdapter
- BRCM_ExtraCapacityGroup

The BRCM_NetworkAdapter class provides network adapter information pertaining to a group of adapters including Broadcom and controllers from other vendors. The BRCM_ExtraCapacityGroup class provides team configuration for the Broadcom Advanced Server Program (BASP). Current implementation provides team information and information about physical network adapters in the team.

BASP provides information about events through event logs. You can use the either *Event Viewer (*provided by Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2) or CIM to inspect and monitor these events. The Broadcom CIM provider also provides event information through the CIM generic event model. The following events are defined by CIM:

- __InstanceCreationEvent
- __InstanceDeletionEvent
- __InstanceModificationEvent

CIM requires the client application to register the events from the client application, using queries as examples to receive events properly. See the following examples:

```
SELECT * FROM __InstanceModificationEvent
where TargetInstance ISA "BRCM_NetworkAdapter"
SELECT * FROM __InstanceModificationEvent
where TargetInstance ISA "BRCM_ExtraCapacityGroup"
SELECT * FROM __InstanceCreationEvent
where TargetInstance ISA "BRCM_NetworkAdapter"
```

```
SELECT * FROM __InstanceDeletionEvent
where TargetInstance ISA "BRCM_NetworkAdapter"
SELECT * FROM __InstanceCreationEvent
where TargetInstance ISA "BRCM_ActsAsSpare"
SELECT * FROM __InstanceDeletionEvent
where TargetInstance ISA "BRCM_ActsAsSpare"
```

For detailed information about these events, see the CIM documentation at http://www.dmtf.org/standards/published_documents/DSP0004V2.3_final.pdf.

Loading the CIM Libraries

By default, the Broadcom Advanced Control Suite utility does not load the CIM libraries. You need to select this option.

To load the CIM libraries on your PC, do the following:

1. Download the BACS utility from the Allied Telesis website.

   This utility is available from the **www.alliedtelesis.com/support/software** website. After you have accessed this website, enter the model number in the **Search by Product Name** box and click **Find** to view the current list of available files.

2. Download BACS onto your PC.

3. On your PC, open the InstallShield.

   Within the BACS utility, there is an option to load the CIM libraries. The BACS CIM Option Window is displayed. See Figure 24 on page 126.

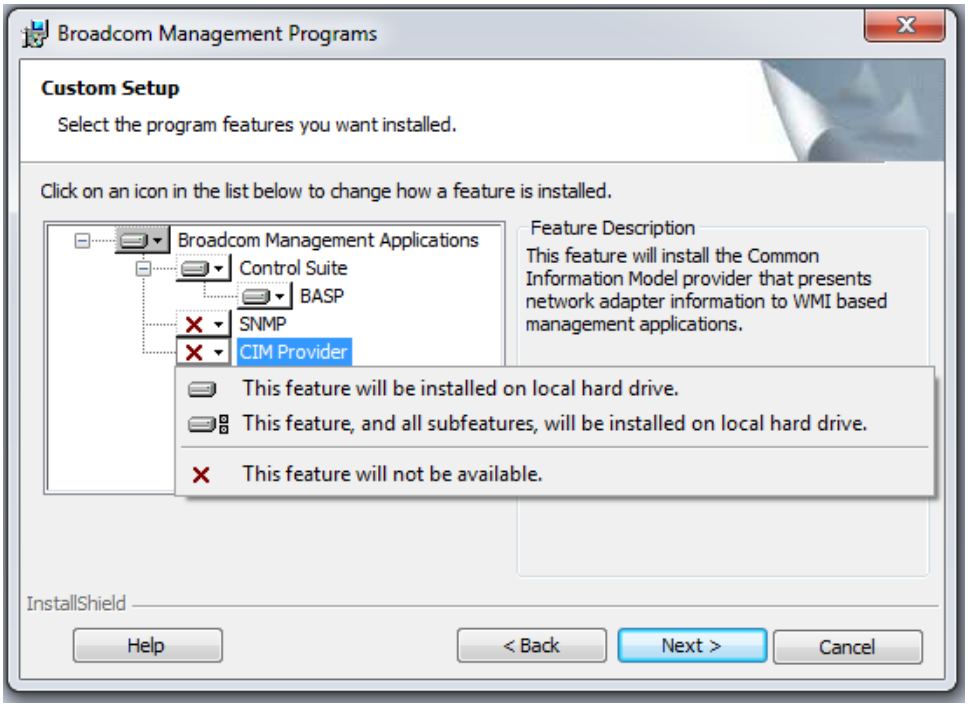
Broadcom Management Programs
Custom Setup
Select the program features you want installed.
Click on an icon in the list below to change how a feature is installed.
Broadcom Management Applications
Control Suite
BASP
SNMP
CIM Provider
Feature Description
This feature will install the Common Information Model provider that presents network adapter information to WMI based management applications.
This feature will be installed on local hard drive.
This feature, and all subfeatures, will be installed on local hard drive.
This feature will not be available.
InstallShield
Help
< Back
Next >
Cancel

Figure 24. BACS CIM Option Window

4. Select CIM Provider.
5. Select one of the following:
   - ❒ This feature will be installed on local hard drive
   - ❒ This feature, and all subfeatures, will be installed on local hard drive
6. Click **Next**.
7. Follow the on-screen instructions to complete the installation.

Installing SNMP

The BASP version of SNMP has two components that are described in the following sections:

- ❒ "BASP Subagent" on page 127
- ❒ "BASP Extensible-Agent" on page 127

BASP Subagent

The BASP subagent, baspmgnt.dll, is designed for the Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 platforms. You must install the SNMP service before installing the BASP subagent.

The BASP subagent allows an SNMP manager software to actively monitor the configuration and performance of the Broadcom Advanced Server features. The subagent also provides an alarm trap to an SNMP manager to inform the manager of any changes to the conditions of the BASP component.

The BASP subagent allows monitoring of the configurations and statistics of the BASP teams, the physical NIC adapters participating in a team, and the virtual NIC adapters created as the result of teaming. Non-teamed NIC adapters are not monitored. The BASP configuration data includes information such as team IDs, physical-virtual-VLAN-team adapter IDs, physical-virtual-VLAN-team adapter descriptions, and the MAC addresses of the adapters.

The statistics include detailed information such as data packets transmitted and received for the physical-virtual-VLAN-team adapters.

The alarm trap forwards information about the changes in configuration of the physical adapters participating in a team, such as whether or not the physical adapter link is up or down and each time the adapter is installed or removed.

To monitor this information, an SNMP manager must load the Broadcom BASP MIB database files to allow monitoring of the information described above. The following files are posted on the Allied Telesis web site:

- ❒ baspcfg.mib
- ❒ baspstat.mib
- ❒ basptrap.mib

BASP Extensible-Agent

The Broadcom NetXtreme II Gigabit Ethernet Controller Extended Information SNMP extensible-agent (bcmif.dll) is designed for Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 SNMP service. You must install the Windows 2000 Server SNMP service before installing the extensible-agent.

The extensible-agent allows the SNMP manager software to actively monitor the configurations of the Broadcom NetXtreme II adapter. It supplements the information already provided by the standard SNMP Management Network Interface information.

The extensible-agent provides in-depth information about a Broadcom NetXtreme II adapter including:

- MAC address
- Bound IP address
- IP subnet mask
- Physical link status
- Adapter state
- Line speed
- Duplex mode
- Memory range
- Interrupt setting
- Bus number
- Device number
- Function number

To monitor this information, an SNMP manager needs to load the Broadcom Extended information MIB file to allow monitoring of the information listed above. See the following procedure.

The monitored workstation requires the installation of the Broadcom Extended Information SNMP extensible-agent, bcmif.dll, and requires the Microsoft Windows Server 2003, Windows Server 2008, or Windows Server 2008 R2 SNMP service to be installed and loaded.

Loading the SNMP Libraries

By default, the BACS utility does not load the SNMP libraries. You need to select this option.

To load the SNMP libraries on your PC, do the following:

1. Download the BACS utility from the Allied Telesis website.

   This utility is available from the **www.alliedtelesis.com/support/software** website. After you have accessed this website, enter the model number in the **Search by Product Name** box and click **Find** to view the current list of available files.

2. Download BACS onto your PC.

3. On your PC, open the InstallShield.

4. Select SNMP.

   The BACS SNMP Option Window is displayed. See Figure 24.

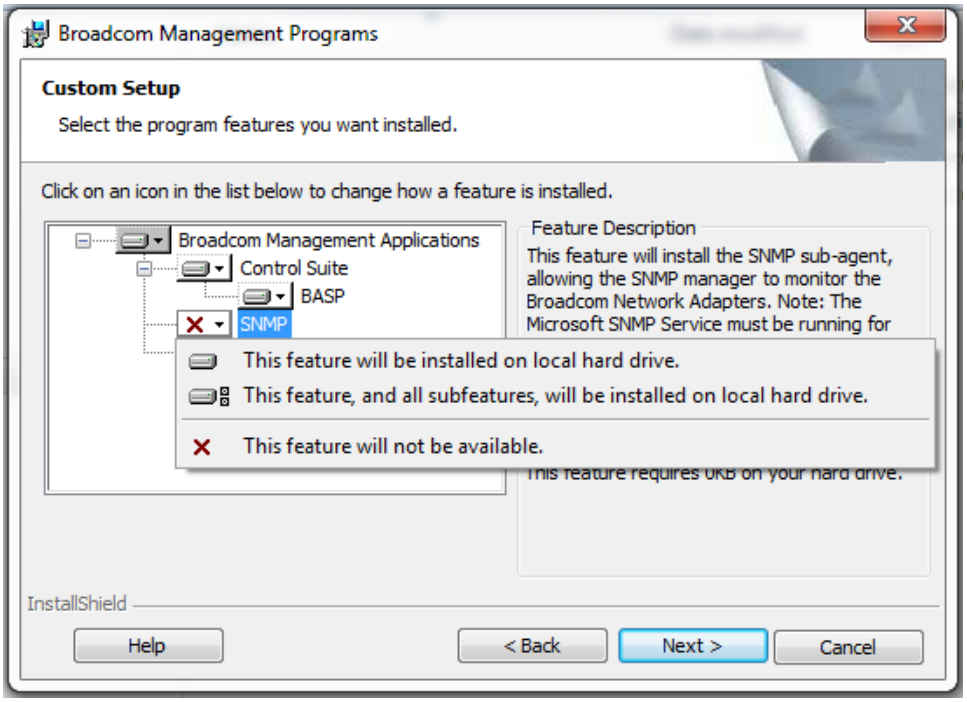
Broadcom Management Programs
Custom Setup
Select the program features you want installed.
Click on an icon in the list below to change how a feature is installed.
Broadcom Management Applications
Control Suite
BASP
SNMP
Feature Description
This feature will install the SNMP sub-agent, allowing the SNMP manager to monitor the Broadcom Network Adapters. Note: The Microsoft SNMP Service must be running for
This feature will be installed on local hard drive.
This feature, and all subfeatures, will be installed on local hard drive.
This feature will not be available.
InstallShield
Help
< Back
Next >
Cancel

Figure 25. BACS SNMP Option Window

5. Select one of the following:

   - ❒ This feature will be installed on local hard drive
   - ❒ This feature, and all subfeatures, will be installed on local hard drive

6. Click **Next**.

7. Follow the on screen instructions to complete the installation.

Chapter 10

Installing Management Applications

This chapter provides information about prerequisites for installing management applications as well as procedures instructions. This chapter discusses the following topics:

- ❒ “Installing Broadcom Advanced Control Suite 3 and Related Management Applications” on page 132
- ❒ “Modifying Management Applications” on page 137
- ❒ “Repairing Management Applications” on page 138
- ❒ “Removing Management Applications” on page 139

Installing Broadcom Advanced Control Suite 3 and Related Management Applications

The Broadcom Advanced Control Suite 3 (BACS 3) software and related management applications can be installed from the source-file directory or by using the silent install option. See the following:

- ❒ “Checking .NET Framework Requirements” on page 133
- ❒ “Using the Installer” on page 134
- ❒ “Using the Silent Install Option” on page 134

After you use the source-file directory or the silent install option, the following features are installed on your system:

- ❒ **Control Suite**. Broadcom Advanced Control Suite 3 (BACS 3).
- ❒ **BASP**. Installs Broadcom Advanced Server Program.
- ❒ **SNMP**. Installs the Simple Network Management Protocol subagent.
- ❒ **CIM Provider**. Installs the Common Information Model provider.

Note
Ensure that the Broadcom network adapter(s) is physically installed in the system before installing BACS 3.

Note
Before installing Broadcom Advance Control Suite 3, verify that .NET Framework 2.0, or above, is installed.

Note
Before you begin the installation, close all applications, windows, or dialog boxes.

Note
To use the TCP/IP Offload Engine (TOE), you must have Windows Server 2003 with Service Pack 2 (SP2).

Checking .NET Framework Requirements

Before you use either the source-file directory or the silent install option, you must make sure that your system meets the minimum installation requirements.

Microsoft .NET Framework 2.0 includes the runtime and associated files needed to run BACS 3, and must be installed on your system in order for BACS 3 to operate. For information on the minimum and recommended .NET Framework versions for your operating system, see Table 6.

Note
You do not need to upgrade .NET for the Windows Server 2008, Windows Server 2008 R2, Windows Vista, or Windows 7 Operating Systems.

Note
For optimal performance of BACS 3, Broadcom recommends .NET Framework 2.0 SP1, .NET Framework 3.0 SP1, or .NET Framework 3.5, depending on your operating system.

Table 6. Minimum and Recommended .NET Framework Versions for BACS 3

Operating System	Minimum Required		Recommended	
	Version	How to Obtain	Version	How to Obtain
Windows Server 2003	.NET 2.0	Download from Microsoft	.NET 2.0 SP1	Download from Microsoft
Windows Server 2003 R2	.NET 2.0	Included in OS package, but by default, not included during installation	.NET 2.0 SP1	Download from Microsoft
Windows Server 2008	.NET 2.0	Included in .NET 2.0 SP1, which is included during OS installation	NET 2.0 SP1	Included in OS package

Note
Starting BACS 3 without .NET Framework (version 2.0 or above) installed on your system results in an error.

Note
Long startup times for BACS 3 may be caused by a limitation of .NET Framework 2.0, as described in Microsoft knowledge base article KB936707. To improve the startup time of BACS 3, apply .NET Framework 2.0 SP1 (or appropriate version for your OS as shown in the Recommended column of Table 6), and reboot your system.

Using the Installer

The driver software is available for download from the Allied Telesis web site at **www.alliedtelesis.com/support**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of available software drivers.

To install the management applications, do the following:

Note
Before starting the installation, verify that .NET Framework 2.0 or above is installed. This ensures optimal performance of BACS 3.

1. Open the MgmtApps folder, select IA32 or x64, and then double-click **Setup.exe** to open the InstallShield Wizard.
2. Click **Next** to continue.
3. After you review the license agreement, click **I accept the terms in the license agreement** and then click **Next** to continue.
4. Select the features you want installed. If you receive a warning regarding .NET Framework 2.0, then press OK to continue installing BACS 3 and manually install .NET Framework 2.0 when installation completes, or Cancel to quit.
5. Click **Next**.
6. Click **Install**.
7. Click **Finish** to close the wizard.

Using the Silent Install Option

You can use the silent install option to install from a source folder or any folder. You can create a log file during the installation procedure. In addition, you can specify which features you will install on your system. See the following sections:

- “Performing a Silent Install from the Installer Source Folder” on page 135
- “Performing a Silent Install and Creating a Log File” on page 135
- “Performing a Silent Install from any Folder” on page 135

- ❒ "Performing a Silent Install by Feature on IA32 Platforms" on page 136
- ❒ "Performing a Silent Install by Feature on AMD64/EM64T Platforms" on page 136
- ❒ "Performing a Silent Install from Within a Batch File" on page 136

Note
All commands are case sensitive.

Note
User must "Run as Administrator" for Vista when using "msiexec" for "silent" install/uninstall(s).

Performing a Silent Install from the Installer Source Folder

To perform a silent install (or upgrade) from within the installer source folder, enter:

```
setup /s /v/qn
```

If performing a silent upgrade, your system may reboot automatically. To suppress the reboot, enter:

```
setup /s /v"/qn REBOOT=ReallySuppress"
```

Performing a Silent Install and Creating a Log File

To perform a silent install and create a log file, enter:

```
setup /s /v"/qn /L f:\ia32\1testlog.txt"
```

The 1testlog.txt log file is created at f:\ia32.

Performing a Silent Install from any Folder

To perform a silent uninstall from any folder on the hard drive, enter:

```
msiexec /x "{26E1BFB0-E87E-4696-9F89-B467F01F81E5}" /
qn
```

Note
The hexidecimal number above may differ from your current installer. Check the Key name corresponding with the Broadcom Advanced Control Suite 3 (BACS) application in HKLM\Software\Microsoft\Windows\CurrentVersion\Uninstall for the correct hexidecimal number.

Note
After performing a silent uninstall, it is necessary to reboot the system before reinstalling this installer. If you do not perform a reboot, BASP does not install correctly.

Performing a Silent Install by Feature on IA32 Platforms

To perform a silent install by feature on IA32 platforms, enter:

Note
CHM32 or CHM64 installs the BACS help file and must be included when installing the BACS feature.

Use ADDSOURCE to include any of the features listed below.

```
setup /s /v"/qn
ADDSOURCE=BACSi32,CHM32,BASPi32,SNMPi32,CIMi32"
```

Performing a Silent Install by Feature on AMD64/EM64T Platforms

To perform a silent install by feature on AMD64/EM64T platforms, enter:

```
setup /s /v"/qn
ADDSOURCE=BACSa64,CHMa64,BASPa64,SNMPa64"
```

Performing a Silent Install from Within a Batch File

To perform a silent install from within a batch file and wait for the install to complete before continuing with the next command line, enter:

```
start /wait setup /s /w /v/qn
```

Modifying Management Applications

To modify the management applications, do the following:

1. In Control Panel, double-click **Add or Remove Programs**.
2. Click **Broadcom Management Programs** and then click **Change**.
3. Click **Next** to continue.
4. Click **Modify** to change program features.
5. Click **Next** to continue.
6. Click on an icon to change how a feature is installed.
7. Click **Next**.
8. Click **Install**.
9. Click **Finish** to close the wizard.
10. Reboot your system to complete the modification of the management applications.

Repairing Management Applications

To repair or reinstall the management applications, do the following:

1. In Control Panel, double-click **Add or Remove Programs**.
2. Click **Broadcom Management Programs**, and then click **Change**.
3. Click **Next** to continue.
4. Click **Repair** to repair errors in installed applications.
5. Click **Next** to continue.
6. Click **Install**.
7. Click **Finish** to close the wizard.

Removing Management Applications

To remove all management applications, do the following:

1. In Control panel, double-click Add or Remove Programs.
2. Click **Broadcom Management Programs**, and then click **Remove**.
3. Reboot your system to complete the removal of management applications.

Chapter 11
Troubleshooting

This chapter provides troubleshooting information. It discusses the following topics:

- ❒ “Checking Hardware Diagnostics” on page 142
- ❒ “Checking Port LEDs” on page 143
- ❒ “Consulting the Troubleshooting Checklist” on page 144
- ❒ “Solving Microsoft Windows Server 2008 R2 Hyper-V Issues” on page 147
- ❒ “Solving Broadcom Boot Agent and Broadcom Advanced Server Program (BASP) Issues” on page 150
- ❒ “Solving Miscellaneous Issues” on page 152

Within the chapter there are several references to the *Broadcom Advanced Control Suite 3 User Guide*. You can download this manual from the Allied Telesis Website at **www.alliedtelesis.com/support/software**. After you have accessed this website, enter the model number in the **Search by Product Name** box and then click **Find** to view the current list of documents.

Checking Hardware Diagnostics

Loopback diagnostic tests are available for testing the adapter hardware. These tests provide access to the adapter internal and external diagnostics, where packet information is transmitted across the physical link. For instructions and information on running tests in an MS-DOS environment, see Chapter 12, “User Diagnostics” on page 155. For Windows environments, see “Running Diagnostic Tests” in the *Broadcom Advanced Control Suite 3 User Guide* which you can download from the Allied Telesis website.

Checking Port LEDs

To check the state of the network link and activity, see the following sections:

- "AT-2973SX Adapter Physical Description" on page 17
- "AT-2973T Adapter Physical Description" on page 18
- "AT-2973T/4 Adapter Physical Description" on page 21

Consulting the Troubleshooting Checklist

Caution
Before you open the cabinet of your server to add or remove the adapter, see “Reviewing Safety Precautions” on page 29.

The following checklist provides recommended actions to resolve problems installing or running the AT-2973SX, AT-2973T, or AT-2973T/4 adapters in your system:

- ❒ Inspect all cables and connections. Verify that the cable connections at the network adapter and the switch are attached properly. Verify that the cable length and rating comply with the requirements listed in “Connecting the Network Cables” on page 38.
- ❒ Check the adapter installation by reviewing “Installing a Network Adapter Card” on page 34. Verify that the adapter is properly seated in the slot. Check for specific hardware problems, such as obvious damage to board components or the PCI edge connector.
- ❒ Check the configuration settings and change them if they are in conflict with another device.
- ❒ Verify that your server is using the latest BIOS.
- ❒ Try inserting the adapter in another slot. If the new position works, the original slot in your system may be defective.
- ❒ Replace the failed adapter with one that is known to work properly. If the second adapter works in the slot where the first one failed, the original adapter is probably defective.
- ❒ Install the adapter in another functioning system and run the tests again. If the adapter passed the tests in the new system, the original system may be defective.
- ❒ Remove all other adapters from the system and run the tests again. If the adapter passes the tests, the other adapters may be causing contention.

Checking Current Drivers

This section describes how to check that the current drivers are loaded properly for the Windows and Linux platforms.

Windows

See “Viewing Vital Signs” in the *Broadcom Advanced Control Suite 3 User Guide* to view vital information about the adapter, link status, and network connectivity.

Linux

To verify that the bnx2.o driver is loaded properly, enter:

```
lsmod
```

If the driver is loaded, a line similar to one Table 7 is displayed, where size indicates the *size* of the driver in bytes, and *n* is the number of adapters configured.

Table 7. Linux Module Size

Module	Size	Used by
BCM5709	size	n

Running a Cable Length Test

For a Windows operating systems, see "Analyzing Cables" in the *Broadcom Advanced Control Suite 3 User Guide* for information on running a cable length test.

Testing Network Connectivity

This section describes how to test network connectivity for the Windows and Linux platforms.

Note
When using forced link speeds, verify that both the adapter and the switch are forced to the same speed, or that at least one link partner is configured for auto-negotiation.

Windows

In the Windows platforms, use the ping command to test network connectivity.

Note
Network connectivity can also be tested using the "Testing the Network" feature in the *Broadcom Advanced Control Suite 3 User Guide*.

To determine if the network connection is working, do the following:

1. Click **Start**, and then click **Run**.
2. Type `cmd` in the **Open** box, and then click **OK**.
3. Type `ipconfig /all` to view the network connection to be tested.
4. Type `ping IP address`, and then press **Enter**.

The ping statistics that are displayed indicate whether the network connection is working or not.

Linux

To verify that the Ethernet interface is up and running on a Linux platform, run `ifconfig` to check the status of the Ethernet interface. In addition, you can enter the `netstat -i` command to check the statistics on the Ethernet interface. See “Installing Linux Driver Software” on page 68 for information on `ifconfig` and `netstat`.

Ping an IP host on the network to verify connection has been established. From the command line, type `ping IP address`, and then press **Enter**.

The ping statistics that are displayed indicate whether or not the network connection is working.

Solving Microsoft Windows Server 2008 R2 Hyper-V Issues

Microsoft Windows Server 2008 R2 Hyper-V™ is a hypervisor virtualization system. For detailed information about Hyper-V, see http://www.microsoft.com/windowsserver2008/en/us/hyperv.aspx.

This section addresses issues that affect the configuration of NetXtreme II network adapters and teamed adapters when Hyper-V is used.

> **Note**
> Ensure that Integrated Services, which is a component of Hyper-V, is installed in the guest operating system (child partition) for full functionality.

Single Network Adapter

When configuring a NetXtreme II network adapter for Hyper-V, be aware of the following:

- An adapter that is bound to a virtual network should not be configured for VLAN tagging through the driver's advanced properties. Instead, Hyper-V should manage VLAN tagging exclusively.
- Since Hyper-V does not support Jumbo Frames, it is recommended that this feature not be used or connectivity issues may occur with the child partition.
- The Locally Administered Address (LAA) set by Hyper-V takes precedence over an address set in the adapter's Advanced Properties.
- A TOE-enabled network adapter that is bound to a Hyper-V virtual network reports TOE as an offload capability in BACS; however, TOE does not work. This is a limitation of Hyper-V because this system does not support TOE.
- In an IPv6 network, a team that supports Checksum Offload (CO) and Large Send Offload (LSO) and is bound to a Hyper-V virtual network reports CO and LSO as an offload capability in BACS. Also, in an IPv6 network, a team that supports CO or LSO and is bound to a Hyper-V virtual network reports CO or LSO as an offload capability in BACS. However, in both instances CO and LSO do not work. This is a limitation of Hyper-V because this system does not support CO and LSO in an IPv6 network.

Teamed Network Adapters

The following Broadcom team types are supported with Hyper-V:

- Smart Load Balancing and Failover (configured only for one primary and one standby)
- Link Aggregation (IEEE 802.3ad LACP)
- Generic Trunking (FEC/GEC) 802.3ad Draft Static

When configuring a team of NetXtreme II network adapters on a Hyper-V system, be aware of the following:

- Create the team prior to binding the team to the Hyper-V virtual network
- Create a team only with an adapter that is not already assigned to a Hyper-V virtual network.
- A TOE-enabled team that is bound to a Hyper-V virtual network reports TOE as an offload capability in BACS; however, TOE does not work. This is a limitation of Hyper-V because this system does not support TOE.
- In an IPv6 network, a team that supports Checksum Offload (CO) and Large Send Offload (LSO) and is bound to a Hyper-V virtual network reports CO and LSO as an offload capability in BACS. Also, in an IPv6 network, a team that supports CO or LSO and is bound to a Hyper-V virtual network reports CO or LSO as an offload capability in BACS. However, in both instances CO and LSO do not work. This is a limitation of Hyper-V because this system does not support CO and LSO in an IPv6 network.
- To successfully perform VLAN tagging for both the host (parent partition) and the guest (child partition) with the BASP teaming software, you must configure the team for tagging. Unlike VLAN tagging with a single adapter, tagging cannot be managed by Hyper-V when using BASP software.

Removing the Device Drivers

Uninstall the Broadcom NetXtreme II device drivers from your system only through the InstallShield wizard. Uninstalling the device drivers with Device Manager or any other means may not provide a clean uninstall which, in turn, may cause the system to become unstable. For information on uninstalling Broadcom NetXtreme II device drivers, see “Removing the Device Drivers” on page 97.

Upgrading from Windows Server 2000 to Windows Server 2003

When a Broadcom NetXtreme II adapter is installed in your system, Allied Telesis recommends that you uninstall the adapter's driver before performing an OS upgrade from the Windows Server 2000 Operating System to the Windows Server 2003 Operating System. This ensures that no errors are encountered in the installation of the Windows Server 2003 drivers for the NetXtreme II adapters. There are individual device drivers for Windows Server 2000 and Windows Server 2003. As a result, you must install the Windows Server 2003 drivers after the OS upgrade is completed.

Preparing an Answer File

When creating an answer file for an unattended installation or for the System Preparation Tool (Sysprep) utility, the following lines must be included under the [Unattend] section:

```
OemPreinstall=Yes
OemPnpDriversPath=Drivers\NIC
```

Note
This does not include an unattended installation when performed from a CD-ROM.

Note
The path shown in OemPnpDriversPath can be appended with the path to other applicable drivers.

For an unattended installation, place the Broadcom NetXtreme II driver files in the OEM\$1\Drivers\NIC directory. For Sysprep, the drivers are located in Drivers\NIC at the root of the system drive. The Broadcom NetXtreme II driver files are listed below according to the operating system to be installed:

- **Windows Server 2003 (ia32)**: bxvbd.inf, bxvbdx.sys, bxvbd.cat, bxnd.inf, bxnd.cat, bxnd52x.sys, bxndcox.dll, bxdiag.cat, bxdiag.inf, bxdiagx.sys, wdfcoinstaller01005.dll, and wUDFUpdate_01005.dll
- **Windows Server 2003 (x64)**: bxvbd.inf, bxvbda.sys, bxvbd.cat, bxnd.inf, bxnd.cat, bxnd52a.sys, bxndcoa.dll, bxdiag.cat, bxdiag.inf, bxdiaga.sys, wdfcoinstaller01005.dll, and wUDFUpdate_01005.dll

When applying network properties through an answer file for a NetXtreme II device where the PnP iD is the identifier, as follows:

For a BCM5709C NetXtreme II GigE - InfId = "b06bdrv\l2nd&pci_163914e4"

For a BCM5709S Netxtreme II GigE - InfId = "b06bdrv\l2nd&pci_163a14e4"

Currently, the PCI location (PCI bus, device, and function numbers) method is not supported for the NetXtreme II device as an identifier or the adapter in the answer file due to a limitation with the Windows operating system.

Solving Broadcom Boot Agent and Broadcom Advanced Server Program (BASP) Issues

This section discusses issues with the Broadcom Boot Agent and Broadcom Advanced Server (BASP) as well as provides solutions.

Problem: Unable to obtain network settings through DHCP using PXE.

Solution: For proper operation, make sure that the Spanning Tree Protocol (STP) feature is disabled or that portfast mode (for Cisco switches) is enabled on the port to which the PXE client is connected. For instance, set spantree portfast 4/12 enable.

Problem: A BASP team in Windows Server 2003 may not function properly if a team member driver property is modified.

Solution: Due to a limitation in Windows Server 2003, the features of team members should remain static during the entire life of the team. To change the characteristics of a team member, remove the team member from the team, modify the team member, and then the adapter to the team again. This limitation does not exist in Windows Server 2008 or Windows Server 2008 R2.

Problem: A system containing an 802.3ad team causes a Netlogon service failure in the system event log and prevents it from communicating with the domain controller during boot up.

Solution: Microsoft Knowledge Base Article 326152 (http://support.microsoft.com/kb/326152/en-us) indicates that Gigabit Ethernet adapters may experience problems with connectivity to a domain controller due to link fluctuation while the driver initializes and negotiates a link with the network infrastructure. The link negotiation is further affected when the Gigabit adapters are participating in an 802.3ad team due to the additional negotiation with a switch required for this team type. As suggested in the Knowledge Base Article above, disabling media sense as described in a separate Knowledge Base Article 239924 (http://support.microsoft.com/kb/239924/) has shown to be a valid workaround when this problem occurs.

Problem: The 802.3ad team member links disconnect and reconnect continuously (applies to all operating systems).

Solution: This is a third-party issue. It is seen only when configuring an 802.3ad team with more than two members on the server and connecting an HP2524 switch, with LACP enabled as passive or active. The HP switch shows an LACP channel being brought up successfully with only two team members. All other team member links disconnect and reconnect. This issue does not occur with the Cisco Catalyst 6500 switch.

Problem: A Generic Trunking (GEC/FEC) 802.3ad-Draft Static type of team may lose some network connectivity if the driver to a team member is disabled.

Solution: If a team member supports underlying management software (ASF/IPMI/UMP) or Wake-On-LAN, the link may be maintained on the switch for the adapter despite its driver being disabled. This may result in the switch continuing to pass traffic to the attached port rather than route the traffic to an active team member port. Disconnecting the disabled adapter from the switch allows traffic to resume to the other active team members.

Problem: Large Send Offload (LSO) and Checksum Offload are not working on my team.

Solution: If one of the adapters on a team does not support LSO, LSO does not function for the team. Remove the adapter that does not support LSO from the team or replace it with one that does. This same solution applies to Checksum Offload.

Problem: The advanced properties of a team do not change after changing the advanced properties of an adapter that is a member of the team.

Solution: If an adapter is included as a member of a team and you change any advanced property, then you must rebuild the team to ensure that the team's advanced properties are properly set.

Problem: Errors occur when an RSS-enabled adapter is included as a member of a team on Windows Server 2003, Windows Server 2008, and Windows Server 2008 R2 systems.

Solution: Disable RSS from all members of the team and rebuild the team.

Solving Miscellaneous Issues

This section presents issues and provides solutions for a variety of driver software issues.

Problem: Although installed, the Broadcom Advanced Control Suite 3 (BACS) application does not start and an error message appears.

Solution: NET Framework 2.0 is required for BACS 3 to operate. Install .NET Framework 2.0.

Problem: Broadcom Advanced Control Suite 3 takes a long time to start up.

Solution: This is a limitation of .NET Framework 2.0. Apply .NET Framework 2.0 SP1 and reboot your system.

Problem: The Broadcom NetXtreme II adapter may not perform at optimal levels on some systems if it is added after the system has booted.

Solution: The system BIOS in some systems does not set the cache line size and the latency timer if the adapter is added after the system has booted. Reboot the system after the adapter has been added.

Problem: Intelligent Platform Management Interface (IPMI) is not functioning properly.

Solution: IPMI works only when LiveLink™ is disabled. See “Configuring LiveLink for a Smart Load Balancing and Failover and SLB (Auto-Fallback Disable) Team” in the *Broadcom Advanced Control Suite 3 User Guide*.

Problem: Cannot configure Resource Reservations in BACS 3 after SNP is uninstalled.

Solution: Reinstall SNP. Prior to uninstalling SNP from the system, ensure that NDIS is enabled via the checkbox on the Resource Configuration screen, available from the Resource Reservations section of the Configurations tab (see Viewing Resource Reservations in the *Broadcom Advanced Control Suite 3 User Guide*). If NDIS is disabled and SNP is removed, there is no access to re-enable the device.

Problem: TOE performance is more susceptible to packet loss when flow control is disabled.

Solution: Enable flow control to reduce the number of packets lost.

Problem: A DCOM error message (event ID 10016) appears in the System Even Log during the installation of the Broadcom adapter drivers.

Solution: This is a Microsoft issue. For more information, see Microsoft knowledge base KB913119 at http://support.microsoft.com/kb/913119.

Problem: Performance is degraded when multiple BCM57710 network adapters are used in a system.

Solution: Ensure that the system has at least 2 GB of main memory when using up to four network adapters and 4 GB of main memory when using four or more network adapters.

Chapter 12

User Diagnostics

This chapter provides user diagnostic information for the MS-DOS platform. This chapter discusses the following topics:

- ❒ “Overview” on page 156
- ❒ “System Requirements” on page 157
- ❒ “Performing Diagnostics” on page 158
- ❒ “Diagnostic Test Descriptions” on page 161

Overview

Broadcom NetXtreme II User Diagnostics is an MS-DOS based application that runs a series of diagnostic tests. These tests allow you to update device firmware as well as to view and change settings for available adapter properties.

To run Broadcom NetXtreme II User Diagnostics, you must create an MS-DOS 6.22 bootable disk containing the uxdiag.exe file. Next, start the system with the boot disk in drive A. See the following sections:

- For a list of system requirements to run the diagnostic tests, see “System Requirements” on page 157.
- For instructions how to run diagnostic tests on the AT-2973SX, AT-2973T, and AT-2973T/4 adapters, see “Performing Diagnostics” on page 158.
- For descriptions of the available diagnostic tests, see “Diagnostic Test Descriptions” on page 161.

System Requirements

The following system requirements are needed to run user diagnostics:

- MS-DOS 6.22 Operating System
- uxdiag.exe file

Performing Diagnostics

At the MS-DOS prompt, type `uxdiag` followed by the command options.

The uxdiag command options are shown in Table 8. For example, to run all of the diagnostic tests except Group B tests on adapter #1, enter:

```
C:\>uxdiag -c 1 -t b
```

Note
You must include `uxdiag` at the beginning of the command string each time you type a command.

Table 8. uxdiag Command Options

Command Options	Description
uxdiag	Performs all tests on all Broadcom NetXtreme II adapters in your system.
uxdiag -c <devnum>	Specifies the adapter (devnum) to test. Use `all` in place of a specific device number to test all adapters.
uxdiag -cof	Allows tests to continue after detecting a failure.
uxdiag -F	Forces an upgrade of the image without checking the version.
uxdiag -fbc <bc_image>	Specifies the bin file to update the bootcode.
uxdiag -fib <ib_image>	Specifies the bin file for iSCSI boot.
uxdiag -fibc	Programs the iSCSI configuration block. Used only with -fib <ib_image>.
uxdiag -fibp	Programs the iSCSI configuration software. Used only with -fib <ib_image>.
uxdiag -fipmi <ipmi_image>	Specifies the bin file to update IPMI firmware.
uxdiag -fmba <mba_image>	Specifies the bin file to update the MBA.
uxdiag -fncsi <ncsi_image>	Specifies the bin file to update the NCSI firmware.

Table 8. uxdiag Command Options (Continued)

Command Options	Description
uxdiag -fnvm <raw_image>	Programs the raw image into NVM.
uxdiag -fump <ump_image>	Specifies the bin file to update UMP firmware.
uxdiag -help	Displays the Broadcom NetXtreme II User Diagnostics, `uxdiag`, command options.
uxdiag -l <iteration num>	Specifies the number of iterations to run on the selected tests.
uxdiag -idmatch	Enables matching of VID, DID, SVID, and SSID from the image file with device IDs. Used only with -fnvm <raw_image>.
uxdiag -log <file>	Logs the test results to a specified log file.
uxdiag -mba <1/0>	Enables/disables Multiple Boot Agent (MBA) protocol where: 1 = Enable 0 = Disable
uxdiag -mbap <n>	Sets the MBA boot protocol, where: 0 = PXE 1 = RPL 2 = BOOTP 3 = iSCSI_Boot
uxdiag -mbas <n>	Sets the MBA/PXE speed, where: 0 = Auto 1 = 10H 2 = 10F 3 = 100H 4 = 100F 6 = 1000F
uxdiag -mbav <1|0>	Enables/disables MBA VLAN, where: 1 = Enable 0 = Disable
uxdiag -mbavval <n>	Sets MBA VLAN (<65536).
uxdiag -mfw <1/0>	Enables/disables management firmware, where: 1 = Enable 0 = Disable

Table 8. uxdiag Command Options (Continued)

Command Options	Description
uxdiag -t <groups/tests>	Disables certain groups or tests.
uxdiag -T <groups/tests>	Enables certain groups or tests.
uxdiag -ver	Displays the version of Broadcom NetXtreme II User Diagnostics (uxdiag) and all installed adapters.
uxdiag -wol <1/0>	Enables/disables Magic Packet WOL where: 1 = Enable 0 = Disable

Diagnostic Test Descriptions

The diagnostic tests are divided into four groups:

- Basic Functional Tests (Group A)
- Memory Tests (Group B)
- Block Tests (Group C)
- Ethernet Traffic Tests (Group D).

The diagnostic tests are described in Table 9.

Table 9. Diagnostic Tests

Test		Description
Number	Name	
Group A: Basic Functional Tests		
A1	Register	Verifies that registers accessible through the PCI/PCI-E interface implement the expected read-only or read/write attributes by attempting to modify those registers.
A2	PCI Configuration	Checks the functionality of the PCI Base Address Register (BAR) by varying the amount of memory requested by the BAR and verifying that the BAR actually requests the correct amount of memory (without actually mapping the BAR into system memory). Refer to PCI or PCI-E specifications for details on the BAR and its addressing space.
A3	Interrupt	Generates a PCI interrupt and verifies that the system receives the interrupt and invokes the correct ISR. A negative test is also performed to verify that a masked interrupt does not invoke the ISR.
A5	MSI	Verifies that a Message Signaled Interrupt (MSI) causes an MSI message to be DMA'd to host memory. A negative test is also performed to verify that when an MSI is masked, it does not write an MSI message to host memory.
A6	Memory BIST	Invokes the internal chip Built-In Self Test (BIST) command to test internal memory.

Table 9. Diagnostic Tests (Continued)

Test		Description
Number	**Name**	
Group B: Memory Tests		
B1	TXP Scratchpad	The Group B tests verify all of the memory blocks of the Broadcom NetXtreme II adapter by writing various data patterns (0x55aa55aa, 0xaa55aa55, walking zeroes, walking ones, address, etc.) to each memory location, reading back the data, and then comparing it to the value written. The fixed data patterns are used to ensure that no memory bit is stuck high or low, while the walking zeroes/ones and address tests are used to ensure that memory writes do not corrupt adjacent memory locations.
B2	TPAT Scratchpad	
B3	RXP Scratchpad	
B4	COM Scratchpad	
B5	CP Scratchpad	
B6	MCP Scratchpad	
B7	TAS Header Buffer	
B8	TAS Payload Buffer	
B9	RBUF via GRC	
B10	RBUF via Indirect Access	
B11	RBUF Cluster List	
B12	TSCH List	
B13	CSCH List	
B14	RV2P Scratchpads	
B15	TBDC Memory	
B16	RBDC Memory	
B17	CTX Page Table	
B18	CTX Memory	
Group C: Block Tests		
C1	CPU Logic and DMA Interface	Verifies the basic logic functionality of all the on-chip CPUs. It also exercises the DMA interface exposed to those CPUs. The internal CPU tries to initiate DMA activities (both read and write) to system memory and then compares the values to confirm that the DMA operation completed successfully.

Table 9. Diagnostic Tests (Continued)

Test		Description
Number	Name	
C2	RBUF Allocation	Verifies the RX buffer (RBUF) allocation interface by allocating and releasing buffers and checking that the RBUF block maintains an accurate count of the allocated and free buffers.
C3	CAM Access	Verifies the content-addressable memory (CAM) block by performing read, write, add, modify, and cache hit tests on the CAM associative memory.
C4	TPAT Cracker	Verifies the packet cracking logic block (that is, the ability to parse TCP, IP, and UDP headers within an Ethernet frame) as well as the checksum/CRC offload logic. In this test, packets are submitted to the chip as if they were received over Ethernet and the TPAT block cracks the frame (identifying the TCP, IP, and UDP header data structures) and calculates the checksum/CRC. The TPAT block results are compared with the values expected by Broadcom NetXtreme II User Diagnostics and any errors are displayed.
C5	FIO Register	The Fast IO (FIO) verifies the register interface that is exposed to the internal CPUs.
C6	NVM Access and Reset-Corruption	Verifies non-volatile memory (NVM) accesses (both read and write) initiated by one of the internal CPUs. It tests for appropriate access arbitration among multiple entities (CPUs). It also checks for possible NVM corruption by issuing a chip reset while the NVM block is servicing data.
C7	Core-Reset Integrity	Verifies that the chip performs its reset operation correctly by resetting the chip multiple times, checking that the bootcode and the internal uxdiag driver loads/unloads correctly.

Table 9. Diagnostic Tests (Continued)

Test		Description
Number	**Name**	
C8	DMA Engine	Verifies the functionality of the DMA engine block by performing numerous DMA read and write operations to various system and internal memory locations (and byte boundaries) with varying lengths (from 1 byte to over 4 KB, crossing the physical page boundary) and different data patterns (incremental, fixed, and random). CRC checks are performed to ensure data integrity. The DMA write test also verifies that DMA writes do not corrupt the neighboring host memory.
C9	VPD	Exercises the Vital Product Data (VPD) interface using PCI configuration cycles. You must program a proper bootcode into the non-volatile memory. If no VPD data is present (that is, the VPD NVM area is all 0s), the test first initializes the VPD data area with non-zero data before starting the test and restores the original data after the test completes.
C11	FIO Events	Verifies that the event bits in the CPU's Fast IO (FIO) interface are triggering correctly when a particular chip events occur, such as a VPD request initiated by the host, an expansion ROM request initiated by the host, a timer event generated internally, toggling any GPIO bits, or accessing NVM.
Group D: Ethernet Traffic Tests		
D1	MAC Loopback	Enables MAC loopback mode in the adapter and transmits 5000 Layer 2 packets of various sizes. As the packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for errors. Packets are returned through the MAC receive path and never reach the PHY. The adapter should not be connected to a network.

Table 9. Diagnostic Tests (Continued)

Test		Description
Number	**Name**	
D2	PHY Loopback	Enables PHY loopback mode in the adapter and transmits 5000 Layer 2 packets of various sizes. As the packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for errors. Packets are returned through the PHY receive path and never reach the wire. The adapter should not be connected to a network.
D4	LSO	Verifies the functionality of the adapter's Large Send Offload (LSO) support by enabling MAC loopback mode and transmitting large TCP packets. As the packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for proper segmentation (according to the selected MSS size) and any other errors. The adapter should not be connected to a network.
D5	EMAC Statistics	Verifies that the basic statistics information maintained by the chip is correct by enabling MAC loopback mode and sending Layer 2 packets of various sizes. The adapter should not be connected to a network.
D6	RPC	Verifies the Receive Path Catch-up (RPC) block by sending packets to different transmit chains. The packets traverse the RPC logic (though not the entire MAC block) and return to the receive buffers as received packets. This is another loopback path that is used by Layer 4 and Layer 5 traffic within the MAC block. As packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for errors. The adapter should not be connected to a network

Appendix A
Specifications

Physical Specifications

This section provides the dimensions and weight of the adapters.

Dimensions:	AT-2973SX: 14.47 cm x 5.61 cm (5.7 in. x 2.2 in.) AT-2973T: 14.47 cm x 5.61 cm (5.7 in. x 2.2 in.) AT-2973T/4: 14.47 cm x 5.61 cm (5.7 in. x 2.2 in.)
Weight:	AT-2973SX: 68.0 g (.15 lbs.) AT-2973T: 68.0 g (.15 lbs.) AT-2973T/4: 113.4 g (.25 lbs.)

Environmental Specifications

The following environmental specifications apply to the AT-2973SX, AT-2973T, and AT-2973T/4 adapters:

Operating Temperature:	0°C to 50°C (+32°F to +122°F)
Storage Temperature:	-20°C to +70°C (-4°F to +158°F)
Operating Humidity:	30% to 80% (noncondensing)
Storage Humidity:	10% to 95% (noncondensing)
Maximum Operating Altitude:	10,000
Maximum Storage Altitude	35,000 ft.

Power Specifications

The following power specifications apply to the AT-2973SX, AT-2973T, and AT-2973T/4 adapters:

Operating Voltage: 3.3V

Power Consumption: AT-2973SX: 5.28 Watts (maximum), @ +3.3V
AT-2973T: 4.1 Watts (maximum), @ +3.3V
AT-2973T/4: 7.1 Watts (maximum), @ +3.3V

Performance Specifications

The following performance specifications apply to the AT-2973SX, AT-2973T, and AT-2973T/4 adapters:

x4 PCIe v2.0 and v1.1 compliant

Operating Specifications

The following operating specifications apply to the AT-2973SX adapter:

Output Optical Power: -9.5 dBm minimum to -1.5 dBm maximum

Input Optical Power: -17 dBm

Receive Sensitivity: -12.5 dBm with 62.5 um fiber or
-13.5 dBm with 50 um fiber

10/100/1000Base-T Twisted-Pair Port Connectors

This section lists the pin signals for the 10/100/1000Base-T twisted-pair ports for the AT-2973T and AT-2973T/4 adapters. Figure 26 illustrates the pin layout to an RJ-45 connector and port.

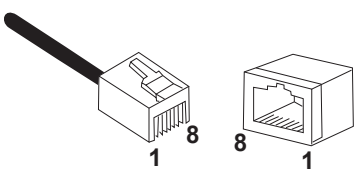

Figure 26. RJ-45 Connector and Port Pin Layout

Table 10 lists the RJ-45 connector pins and their signals when a 1000Base-T port is operating at 1000 Mbps.

Table 10. RJ-45 1000Base-T Connector Pinouts[a]

Pin	Pair	Signal
1	1	TX and RX+
2	1	TX and RX-
3	2	TX and RX+
4	3	TX and RX+
5	3	TX and RX-
6	2	TX and RX-
7	4	TX and RX+
8	4	TX and RX-

a. Bi-directional data on each pair.

Appendix B
Cleaning Fiber Optic Connectors

The fiber optic connector consists of a fiber optic plug and its adapter. The end of the fiber optic cable is held in the core of the ferrule in the plug. Light signals are transmitted through the core of the fiber. Even minor smudges or dirt on the end face of the fiber, completely invisible to the naked eye, can disrupt light transmission and lead to failure of the component or of the entire system. Therefore, it is of utmost importance to clean all fiber optic connectors before use.

Figure 27 shows the ferrule in an SC connector.

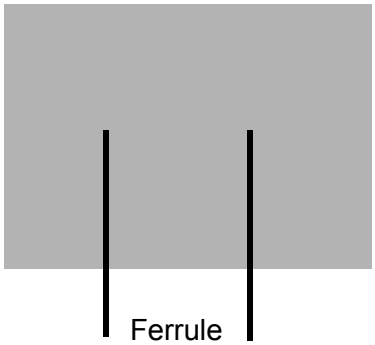

Figure 27. Ferrule in an SC Connector Plug

Figure 28 shows part of the end face of an unclean and clean ferrule.

Figure 28. Unclean and Clean Ferrule

This appendix provides the following procedures

- ❒ “Using a Cartridge-Type Cleaner” on page 172
- ❒ “Using a Swab” on page 174

Using a Cartridge-Type Cleaner

Fiber optic cartridge cleaners are available from many vendors and are typically called “cartridge cleaners,” as shown in Figure 29.

Figure 29. Cartridge Cleaner

Note
Do not use compressed air or aerosol air to clean a fiber optic connector.

To clean a fiber optic connector using a cartridge cleaner, perform the following procedure.

1. With one hand, hold the cartridge cleaner and push the lever on the cleaning cartridge in the direction of the arrow to expose the cleaning surface, as shown in Figure 30.
2. Place the ferrule tip on the exposed cleaning surface and rub the ferrule in a downward direction, as shown in Figure 30.

Figure 30. Rubbing the Ferrule Tip on the Cleaning Surface

Note
Rub the ferrule tip on the cleaning surface in one direction only.

3. When you reach the end of the cleaning surface, pick up the ferrule tip, rotate and place it at the top and rub downwards at least 2 times.

Caution
Failing to pick up the ferrule tip when you reach the bottom of the cleaning surface can result in static electricity that can damage the fiber optic cable.

4. If desired, repeat steps 3 and 4.
5. If a fiber inspection scope is available, use the scope to inspect the ferrule end face to make sure that it is clean.
6. Reconnect the cable to the port or protect the ferrule tip with a dust cap.

Note
Always keep a dust cap on a fiber optic cable when it is not in use.

Note
Do not touch the end face of the ferrule in the connector.

Warning
Do not stare into the laser beam. L2

Warning
Do not look directly at the cable ends or inspect the cable ends with an optical lens. E29

Using a Swab

Specially treated swabs, known as stick cleaners, are available for cleaning inside connector adapters or hard-to-reach ferrule tips. These swabs, often referred to as “lint free” or “alcohol free” swabs, are available from many vendors, as shown in Figure 31. Stick cleaners are available in both 2.5 mm and 1.25 mm sizes for use on SC and MU connectors respectively.

Note
NEVER use a household cotton swab and/or alcohol to clean a fiber optic connector. This may leave a residue on the ferrule tip.

Figure 31. Lint-Free and Alcohol-Free Swabs

Note
Do not use compressed air or aerosol air to clean a fiber optic connector.

To clean a recessed ferrule using a swab, perform the following procedure.

1. Insert the swab into the adapter as shown in Figure 30 and rub the ferrule tip with the swab.

Figure 32. Cleaning a Recessed Ferrule

2. If desired, repeat step 1.

3. If a fiber inspection scope is available, use the scope to inspect the connector to make sure that it is clean and to check for scratches, pits, or other problems that may affect performance.

Note
Always keep a dust cap on a fiber optic cable when it is not in use.

Warning
Do not stare into the laser beam. L2

Warning
Do not look directly at the cable ends or inspect the cable ends with an optical lens. E29